Telephony.

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Building Up Telephone Revenues During the Current Year

According to the 1930 census reports—whose total figures are now being issued—there is plenty of room for growth of rural telephones. The statistics show that out of 6,291,000 farms in the United States telephones are installed on 2,139,194, representing 34 per cent of the total number of farms.

Compared to most countries, of course, rural telephone development in this country is far in the lead, but as long as there is only one telephone for every third farm it is apparent that much remains to be done. Undoubtedly, also, losses have occurred since the census returns were collected, for the business stagnation has affected the volume of every industry, and, like everybody else, rural telephone subscribers have been economizing.

It has been one of the important jobs of the operating companies to maintain their revenues from farm lines during the last year, and it is a task which will have to be continued during 1932.

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The ratio of 34 telephones per 100 farms applies to the country as a whole. Some states run far above this mark in rural telephone development. For instance, Iowa leads all the states with 84.2 telephones per 100 farms. Illinois is second.

The census shows that 58 per cent of the farms in the country have an automobile of some sort, which indicates that the excuse of being compelled to save money by doing without telephone service is a poor one. When 58 out of 100 farms support a car and only 34 think they can afford a telephone—costing a trifling fraction of the automobile investment and upkeep—it is plain that telephone companies need to brush up on their sales efforts.

The fact that less than 16 farms out of 100 pipe water into the house, and that only 13 have electric lights, makes the telephone figures look slightly better, but operating telephone companies ought to get busy and boost that 34 percentage mark materially this year. Aside from the automobile, one analysis of modern farm facilities shows that the American farmer prefers the telephone, plumbing and the electric light in the order named.

* * * *

During the coming year all business concerns will devote a great deal of attention to studying the changes that marked 1931—especially the losses recorded—and plan to deal with them with a view to their recovery. Several telephone groups find it pays to make a study of the telephones ordered out during the last two years, grading them according to the size of the exchanges, and classifying them as to business and residence stations. The survey then goes on into the company-owned rural stations and switched lines.

According to the investigations of one organization, it is shown that the losses in towns of about 10,000 population are under one per cent, while among the rural subscribers the loss has run around 6 per cent.

The system pursued is to interview subscribers who cancelled their service and ascertain the reason why. In many cases it was found that the conditions no longer obtain, and judicious effort resulted in the service being replaced. This was especially true among the rural subscribers, as economic conditions on the farm have noticeably improved within the last six months.

* * * *

At the telephone conventions to be held this winter, and during the coming spring months, state association officers should arrange to devote a great deal of attention to the question of helping member companies increase their revenues.

In making up their programs telephone association leaders can arouse most interest by specializing on this subject which is growing in importance every day. It is what the average telephone man is eager to hear about—that is, practical plans to get new business and to re-install stations that had been ordered out.

General business is bitterly opposing price-cutting, on the reasonable ground that while it may stimulate sales somewhat during a depression the ultimate effect will defeat its purpose. Utility service companies, asked to cut their rates in hard times, face the same situation. There is no sound reason for reducing a fair service rate when business is in a slump, and imperiling the financial safety of the company that must serve the public in good times and bad.

It must not be forgotten that the utility

cannot suspend business until times improve—as can the ordinary business concern. For that reason the utility company must protect its revenues at all times. This is an angle of the situation that should be impressed on the public at every opportunity.

Shopping By Telephone.

In their efforts to increase revenues, companies will not overlook the rapid growth of retail buying by telephone. In many sections business men say this development has been phenomenal. The stores that provide adequate equipment and personnel to handle telephone orders have found this sort of patronage a big factor in their sales.

From the standpoint of the service company, of course, the opportunity lies in selling merchants on the idea and thus add to their own telephone incomes.

Advertising and merchandising authorities are observing the development of telephone sales by stores. One of them recently said that the telephone has become so intrenched in the retail structure "that we can without hesitation visualize the possibility of telephone department stores where customers' needs are looked after only by telephone."

His imagination pictured stores without aisles, show cases or display windows, without clerks to wait on customers in person, and, in fact, without customers calling in person—just plenty of telephones and employes to handle the orders. This is, probably, a rather "long distance" vision.

It is significant, however, that during the recent holiday rush one big Chicago store advertised, urging its women patrons to avoid the nervous strain of a trip downtown and fighting the traffic crowds by doing their shopping over the telephone. Special facilities were provided and detailed advertising of merchandise sales enabled many people to do their buying over the wire and save time and strength instead of "bucking the line" in the shopping jam.

"The growth of shopping by telephone is attributable to a variety of causes," says an article in Editor and Publisher, "one of which is the traffic congestion in the larger cities that makes the use of an automobile for shopping more and more difficult. Another reason is pedestrian traffic, for the average woman dislikes to be jostled by crowds, and as an alternative often turns to the telephone to place her order.

"Standardization of products and competition are further reasons for the increase of shopping by telephone. In many cities retail distribution is becoming decentralized, and shopping centers have sprung up in close proximity to the residential sections, so that 'down-town' merchants, in an attempt to serve and hold their customers, have developed telephone order departments."

* * * *

A large grocery chain system operating in the Middle West, which has been always run on the "cash and carry" basis, has adopted the telephone plan recently. Its telephones are not listed in the telephone directory, but regular customers are notified of the numbers so they may order by wire.

Goods so ordered are delivered for a nominal charge. The plan was first tried in a few stores, and will be extended to cover all of the chain's 1,200 branches.

* * * *

Expansion of telephone departments by merchants will mean that more attention must be paid to keeping the service efficient, both by the telephone company and by the managements of stores handling sales over the wire. The company must provide adequate facilities, and the store employes who make the contact with the customers will need special training to carry on their work to the satisfaction of the patrons.

The latter consideration is of great importance, as most persons will testify that the telephone personnel of the average store has much to learn about diplomatic dealing with buyers. "The voice with the smile" is an essential to successful telephone selling by business organizations.

COMING CONVENTIONS.

Minnesota Telephone Association, Radisson Hotel, Minneapolis, January 26, 27 and 28.

Nebraska Telephone Association, Hotel Paxton, Omaha, February 9-11.

Iowa Independent Telephone Association, Fort Des Moines Hotel, Des Moines, February 24, 25 and 26.

Texas Independent Telephone Association, Texas Hotel, Fort Worth, March 22, 23 and 24.

South Dakota Telephone Association, Sioux Falls, April 6 and 7.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 12, 13 and 14.

Kansas Telephone Association, Jayhawk Hotel, Topeka, April 19, 20 and 21.

Up-State Telephone Association of New York, Jamestown Hotel, Jamestown, May 25, 26 and 27.

Trans-Canada Line in British Columbia

Early Opening Scheduled of Telephone Line Across Canada With Pole Line Mileage of About 4,300 Miles—In British Columbia the Line Takes Shortest Possible Route and Goes Right Over Mountains—Construction Materials Used

By N. F. Pullen,

British Columbia Telephone Co., Vancouver, B. C., Can.

British Columbia's portion of Canada's first transcontinental voice highway was completed late in November.

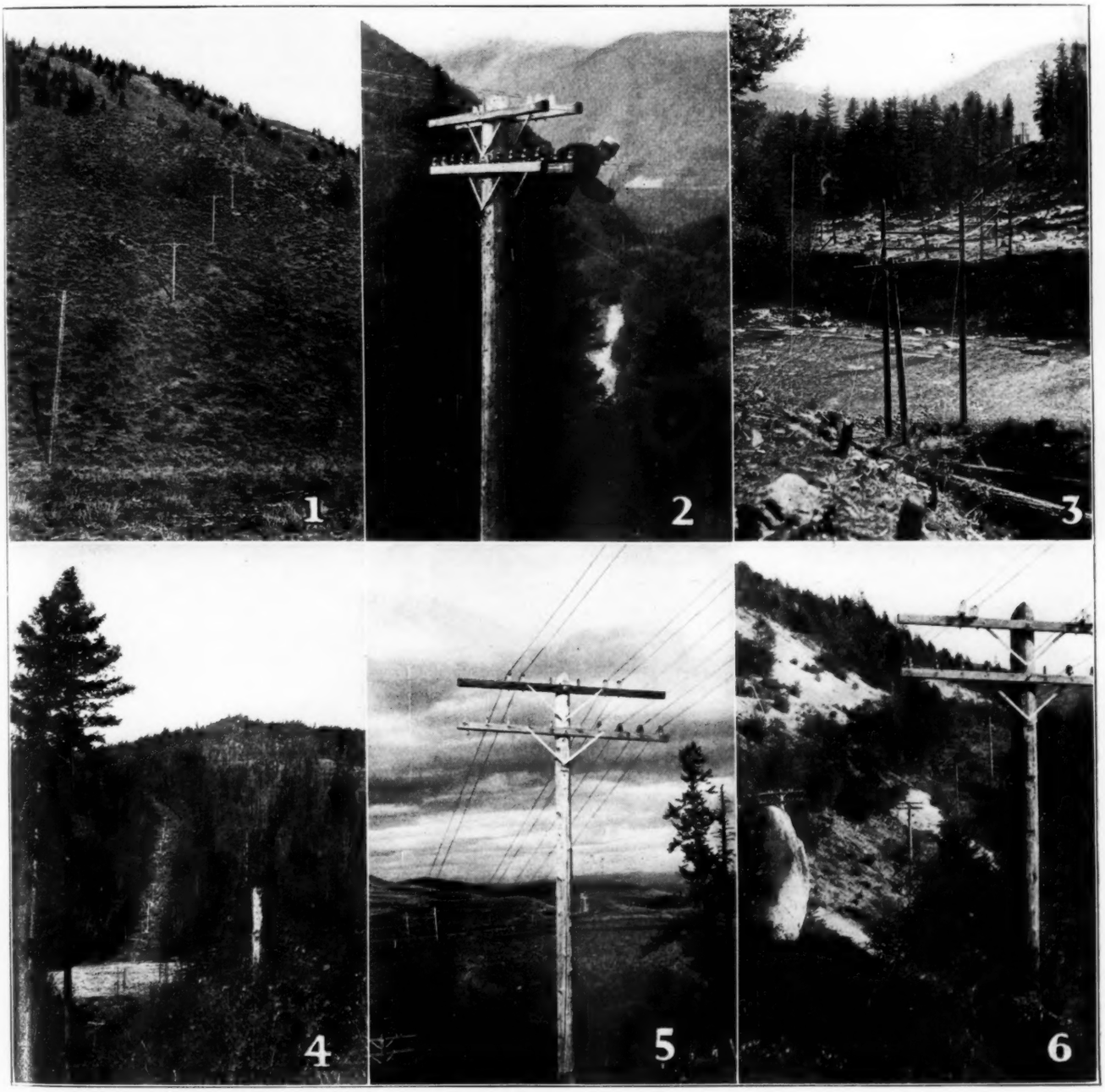
Completion of the entire project, in which all the principal Canadian telephone systems are cooperating, will provide an all-Canadian telephone line from Vancouver, B. C., on the Pacific Coast, to Halifax, Nova Scotia, on the Atlantic Coast. Up to the present time all telephone traffic between western and eastern Canada has been routed by way of the United States. The new line will give a faster and higher grade of service across the Dominion, using only Canadian circuits.

January 15, 1932, has been tentatively set as the opening date for the trans-Canada line.

The B. C. Telephone Co.'s share has been to span British Columbia with two new telephone circuits (four wires), from Vancouver to Crows Nest Station on the Alberta boundary, over a route of approximately 625 miles. The pole line mileage across Canada is about 4,300 miles.

Adding to the difficulties of the British Columbia job, three-quarters of the entire line across Canada's far-west province is through mountainous country. In most cases, instead of following the winding

The Four Wires Being Paid Out From the Rear of the British Columbia Telephone Co. Truck Are Links in the New Trans-Canada Telephone Circuits. The Scene Is Near Mission, B. C.—Stringing Wires on the Trans-Canada Telephone Line Near Mission.



Views of the Types of Construction Used and the Country Passed Through by the "Hill-Climbing" Poles of Trans-Canada Line in British Columbia. 1. Trans-Canada Line Ascending Richter Mountain, B. C. 2. J. Redford, Lineman for the British Columbia Telephone Co., "Sky-Riding" on a Pole in the Mountainous Coquihalla Section. 3. Catenary Crossing on the Line Near Princeton. 4. The Line Ascending Phoenix Mountain. 5. The Trans-Canada Line on Top of Anarchist Mountain. 6. Trees, Boulders, and Steep Grades Fail to Halt the March of the "Hill-Climbing" Poles Through the Rugged Coquihalla Section of British Columbia.

roads, the line takes the shortest possible route and goes right over the mountains. It is 905 miles from Vancouver to Crows Nest Pass by road, but only 625 miles by the trans-Canada telephone line.

The job is the biggest single construction undertaking in the B. C. Telephone Co.'s history. It necessitated the erection of some 35,000 new poles. Linemen, it is estimated, climbed about 1,400 miles in scaling the poles.

The number of carloads of materials required totalled 567, divided as follows: Poles, 500 carloads; crossarms, 28 carloads; copper wire, 24 carloads; hardware, 10 carloads; insulators, 4 carloads; steel wire, 1 carload. If the cars were placed end to end in one train, they would extend more than four miles.

Engineers, in the course of their staking and chaining, walked some 2,040 miles. This does not include the preliminary surveying that had to be done before the route through British Columbia was decided upon.

The telephone men had to scale steep mountains, hack their way through dense timber and wade through deep snow. Rattlesnakes added to the worries of both engineers and construction men. One portion of the line on Cascade Mountain had to be re-staked because the original stakes were gnawed away by porcupines. The stakes, shipped from the Coast, had been in salt water, and the theory is that Mr. Porcupine took a fancy to the salt in them.

The accompanying illustrations give some idea of the character of the country in British Columbia. They also show the nature of the construction.

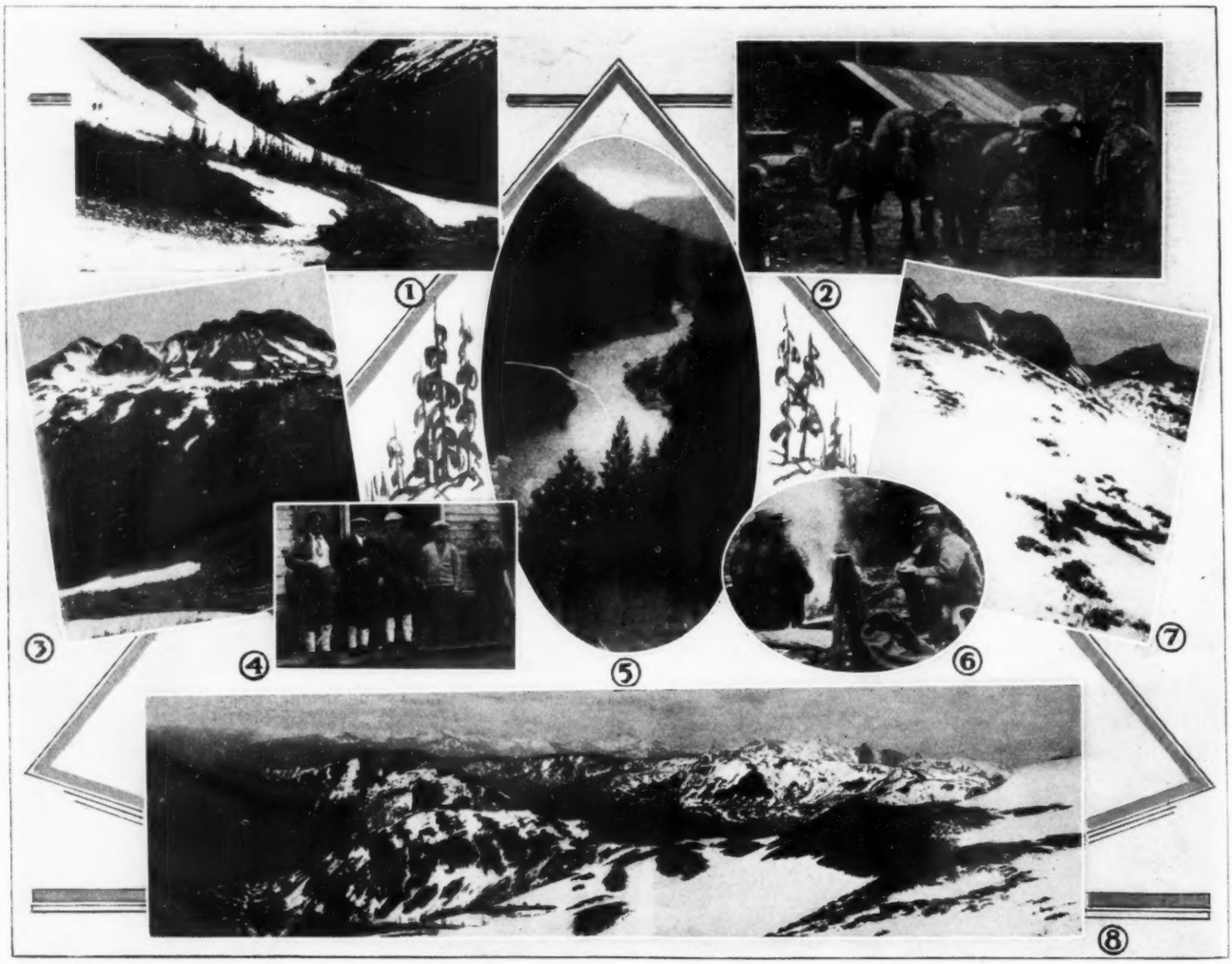
Transmission on the new line will be aided by a chain of "repeaters." There will be 20 repeaters across Canada, with terminal equipment at Vancouver, Winnipeg, Montreal and Halifax. The British Columbia repeaters will be at Nelson and Princeton.

This all-Canadian line is known as the "Trans-Canada Telephone System" and each of seven large telephone systems has equal representation in its management. Each system built its own portion of the line, the planning and designing of which was carried on during the past 10 years by special committees of the Telephone Association of Canada.

The latest type of pole line construction has been used throughout and the total cost of the project is estimated at $10,000,000.

The line extends from Halifax in Nova Scotia to Vancouver in British Columbia, passing through eight Canadian provinces. It was made possible through the cooperation of four large commercial telephone systems and three governmental systems. The seven systems participating in the construction and operation of the new long distance system across Canada are:

The Maritime Telegraph & Telephone Co. (Ltd.), the New Brunswick Telephone Co. (Ltd.), the Bell Telephone Co. of Canada (Ltd.), the Manitoba Telephone



Engineers and Construction Men of the British Columbia Telephone Co. Walked Some 200 Miles Over Country Like That Pictured in Preliminary Surveying Work for the Trans-Canada Line. 1. The Two Little Specks at Left Are George McCartney and J. Lundy Near Head of Kelly Creek. 2. A. H. Lemmon, T. Rabbit, George McCartney and J. Lundy Ready to Start Up Kelly Creek. 3. Coquihalla Mountain. 4. J. Lundy, George McCartney, R. A. Story, A. H. Lemmon and C. C. Boulier at Dornberg's Camp 20 Miles West of Tulameen. 5. The Tulameen River. 6. George McCartney and J. Lundy by Their Campfire. 7. A. H. Lemmon, George McCartney and J. Lundy on Top of Bedded Range With Coquihalla Mountain in Background. 8. Looking South From the Top of Bedded Range. R. A. Storey Contributed These Pictures.

System, the Saskatchewan Government Telephones, the Alberta Government Telephones, and the British Columbia Telephone Co.

Employe Participation in Sales an Individual Responsibility.

Less than three months ago the Lincoln Telephone & Telegraph Co., Lincoln, Neb., launched a carefully thought-out employe participation sales campaign. While the efforts put forth under it have not overcome the drift towards decreased stations, officers of the company feel assured that, formulated as it is and intended for a permanent adjunct to the commercial department, it will prove of great value as a business-builder for the future. The plan calls into action practically all of the 1,400 employes of the company.

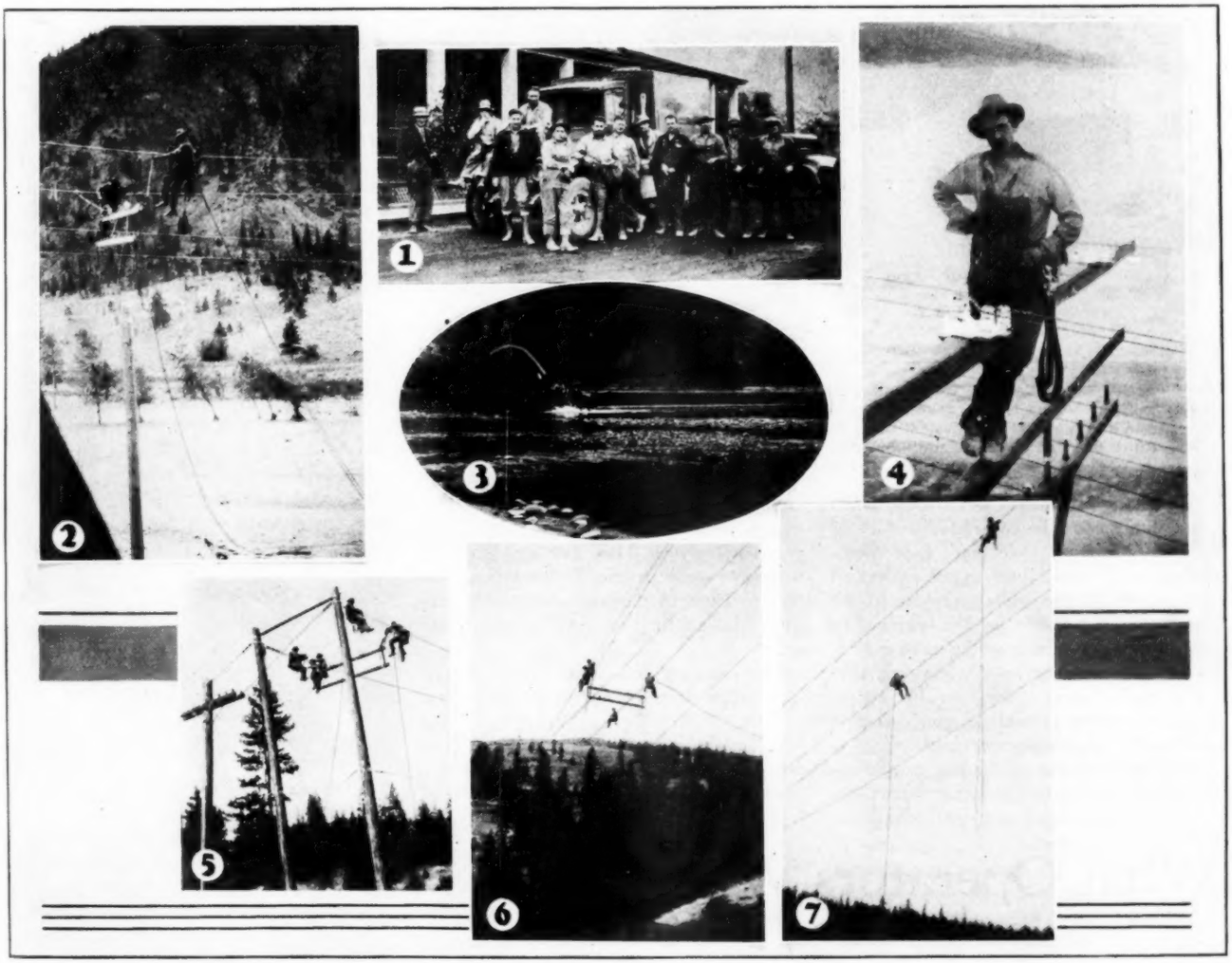
General Manager J. H. Agee says that the company has passed the stage where small groups of hard-working, sales-minded employes can produce sufficient sales to offset the abnormal volume at this time of service removals. He made it plain in a letter to all employes that the new plan is based on the proposition that sales work is no longer a departmental responsibility but a company policy. This means, in the last analysis, an individual responsibility. With every employe a salesman, complete coverage of the existing market is possible and easy.

The production of revenue through the sales of the various services constitutes a function which, primarily, has been the responsibility of the commercial department. Up until the last year and a half, says W. E. Bell, commercial superintendent, the growth has been so rapid that it was not necessary and often not possible to put forth extensive sales effort to produce a substantial increase in stations as well as supplementary equipment. Today the situation is exactly reversed.

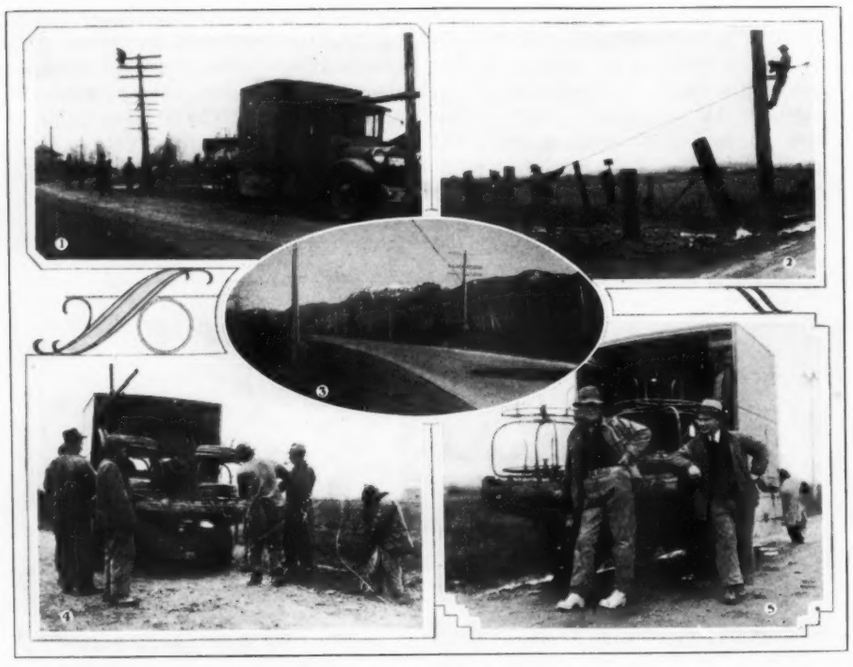
"To meet these swift changes in economic conditions," says Mr. Bell, "greater emphasis had to be put on the matter of selling. We first adopted a general sales plan in which the stimulation was largely put upon the commercial department, where everybody was urged to expend every possible effort; but this, while attended with results that would have been highly regarded in prosperous times did not, it was found, avert net losses in stations.

"The intensive kind of selling the situation required was not possible working through the commercial department alone, and the expense of creating a separate selling organization to gain the desired end would be prohibitive. This can be gained, however, we believe, through making sales a part of the duties of every employe in such a way that he or she is not overburdened. All department heads have accepted the arrangement and are cooperating fully.

To the individual employe this decision simply means that selling is as much a part of the job as any other work with which he is charged. With this thought in mind each employe, irrespective of department, must realize that to be rated as doing



Some Construction Views of the Trans-Canada Telephone Line. 1. Dan Gillis' Gang at Keremeos. Left to Right: D. Gillis, J. Martin, F. Milley, R. Segel, A. Fletcher, E. Edwards, C. Atherton, E. Davis, G. McNeely, A. McCulloch, C. Vance and A. McDonald. 2. E. Davis and A. Fletcher Hanging Cunningham Fixture on Long Span Across Similkameen River. 3. Joe Chop and Team Hauling 50-Foot Poles Across Similkameen River. 4. G. McNeely Showing the Side Point Transposition Bracket Used on the Line. 5, 6 and 7. Building the Line Across the Rock Creek Canyon.



Building the Trans-Canada Telephone Line in the Territory of the British Columbia Telephone Co. Views Nos. 1, 2 and 4 Show Jim McDevitt's Construction Crew Stringing Circuits in the Vicinity of Mission. No. 3 Shows the New Line on the Road to Chilliwack Built by Dan Gillis' Gang, and No. 5, Foreman McDevitt on the Left and His Truck Driver, Jack Elliott.

a first-class job, sales work along with other duties must be considered a part of everyday activities. We don't expect employes to be made into expert salesmen within a short time. The simplicity of the plan makes it possible for the beginner to participate as creditably as the more experienced. It is made essential, however, that the beginner train himself or herself to recognize prospects and to conduct convincing and intelligent interviews.

The actual closing of the sale can be referred to the commercial department. We are insisting that all employes who have done no selling acquaint themselves thoroughly with the functions and rates of the primary services. By putting exchange managers in the role of instructors we expect to have all employes familiar in due time with all they need to know to make sales.

The company is seeking to put the responsibility involved up to the individual so that he recognizes and assumes it. The basis for the company policy is that it must rely on the sales of its service to live, and in turn this makes necessary the work of every employe to help in sales."

What Operators Want to Know

Changes in Method of Handling Cancellation Orders—Subscribers Should Not Be Penalized to Obtain Good Call Completion Results—This Action Does Not Stimulate Toll Business

MRS. MAYME WORKMAN,

Traffic Supervisor, Illinois Telephone Association, Springfield, Ill.

With the introduction of the new toll operating practice some changes were made in the method of handling calls where the customer asked to have his call cancelled.

According to the old routine, as soon as the customer said, "Cancel the call, operator," or something to that effect, we would immediately say, "May we try to complete your call later?" and if the customer was not in a very good humor, which frequently happened when he was unable to reach the called station or party, he would come back with, "Didn't I just tell you to cancel the call?"

According to our new instructions a definite order to cancel a call is accepted without question, except in certain cases in which the customer indicates clearly that he still wants the call but does not understand that the company will make further attempts to complete it. The following are examples of this kind:

(1) If the customer says, "I suppose you will have to cancel the call. I'll try it tomorrow," say: "I shall be glad to try this call tomorrow at any time that is convenient to you."

(2) If the customer says, "Just let the call go, Operator, I'll try to get him this evening," say: "I shall be glad to try this call this evening, Mr. —— (calling party). You may talk from another telephone if you wish."

(3) If the customer says, "All right, cancel it. I'll call again at 6 o'clock," say: "I shall be glad to try this call at 6 o'clock if you wish."

(4) If the customer says, "I'm going out to lunch now. Never mind the call, Operator," say: "I shall be glad to try this call after lunch Mr. —— (calling party), at any time that is convenient to you."

(5) If the customer says, "Never mind the call, Operator. I'm going home now," say: "I shall be glad to try this call whenever it is convenient to you and call you at your home if you wish."

If he then wishes to have a further attempt made to complete the call but does not specify the time, ask, for example: "What time this evening would you like me to try the call?"

In accepting a definite cancellation order say, "All right, sir. I am sorry we were unable to reach Mr. —— (called party or address name or number) for you."

If you do not know the details of the call, say, "All right, sir. I am sorry we were unable to complete your call to —— (called place)."

The change in handling cancellation orders from our customers was made to make the service more pleasing and to avoid annoyance to customers.

This change does not mean that we should not make every effort to complete each toll call filed. A good completion percentage is just as important now as it ever was. But we should not be overzealous in our efforts to complete our calls to the extent of penalizing and annoying our subscribers. This does not stimulate toll business. On the contrary, let us use good judgment and carry out our operating instructions for handling cancellation orders. If we do this we will please our customers and our company.

Questions from Illinois Operators.

1. Are left-handed operators accepted in the larger offices?

2. What length of ring is a toll center operator supposed to give a tributary?

3. When the cords are taken down, should they be used immediately again?

4. If you use the CLR method should you connect the calling party while you are putting the call through?

5. If a subscriber has cancelled a call, is it right to call him back and ask if he wants it tried again?

For answers to these questions from real Illinois operators, turn to page 23.

Prices in the Metal Markets.

New York, January 4: Copper—Quiet; electrolytic spot and future, 7¼c. Tin—Easy; spot and nearby, $21.25; future, $21.55. Lead—Steady; spot New York, 3.75c; East St. Lopis, 3.55c. Zinc—Easier; East St. Louis, spot and future, 3.12c.

Outside Plant Men Talk Things Over

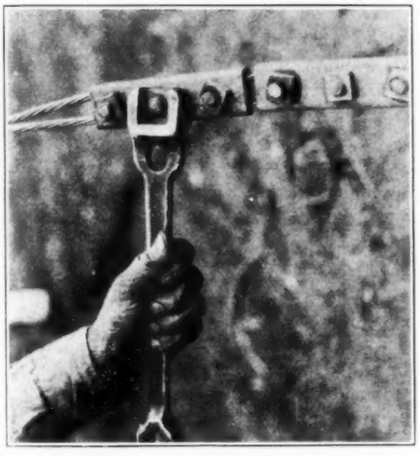
I Wonder Why of an Observing, Traveling Telephone Engineer.

By Ray Blain

I wonder why so many managers fail to equip their linemen with suitable wrenches to properly perform their work?

The lack of good wrenches often slows up the work considerably. A good lag wrench should be in each line belt and special wrenches should always be available to handle such work not easily performed by the lag wrench.

Many seem to think that a lag wrench should meet every wrench requirement for telephone work. While the lag wrench of the present day does have a wide application, there are so many special jobs which can be performed more quickly and easily



An Up-to-Date Lag Wrench for Line Work.

with a special wrench. I believe it is a good idea to have both a set of crescent wrenches and a set of adjustable wrenches available for the construction men in each exchange.

I also wonder why some manufacturer does not come out with a ratchet type lag wrench so that a lineman could place it on a nut of, say, a three-bolt clamp and tighten it by short pulls without ever removing the wrench. Every lineman knows the difficulty of using the present type wrench on guy clamps, even though there is a greater clearance between bolts of the clamps than formerly.

The construction of such a wrench should not be at all difficult and it certainly should find a ready sale.

"Profit by Studyin' the Other Feller's Mistake."

By Jake the Lineman

Howdy, Buddy! Sure glad yer out fer practice this week, fer we're gonna have a right interestin' session. We're not gonna take up enny new signals, but we're jist gonna sit aroun' an' talk over a few of the accidents that happened to some of the telephone fellers during the last year.

So jist make yerself comfortable an' keep the ole ears open fer I want yer ter hear and understand a few reasons why Ole Man Accident has been scorin' on us:

A cable splicer was a drillin' a hole in a basement wall fer a cable clip. He took a position so that the hole was on a level with his eyes, an' while the drillin' was goin' on a small piece of cement flew out an' landed in his right eyeball. Two things caused that accident: First, he should have had on his goggles; and second, he should'a kept his face above the level of his work. Remember me tellin' you that not so long ago?

Cable splicer's helper was skimmin' dirt off the top of hot solder an' fergot ter heat the ladle. Well, when the cold ladle hit the hot solder, things started poppin'. The helper got rattled an' pulled the ladle from the pot. The ladle still had some hot solder in it an' this dropped on the helper's foot an' ankle, causin' second degree burns: Moral: Always heat a ladle before touchin' it to hot solder an' never get rattled when trouble comes up!

Cable splicer's helper was placin' guard rail aroun' the manhole, gettin' ready to remove the cover when an auto struck him. The poor chap was picked up unconscious and sufferin' from a fracture of the skull, both bones of lower right leg broken, and cuts over the right and left eyes. There should'a been some feller worker out there with a red flag warnin' traffic.

Installer was already seated in the rear of the truck, the driver an' two other employes were already in the cab, when the installer decided he had somethin' to say to one of the men in front. So he jumped out of the rear of the truck and started aroun' the right side of the truck. He got to the cab jist as the driver pulled away from the curb, an' in pullin' out on the street the truck had ter pass close to another truck jist ahead. Installer was crushed between the two trucks an' died two days later. Moral: Let the other feller know what yer goin' ter do! He's no mind reader!

Dynamite was bein' used to blast out a rock while diggin' a pole hole. After the feller lit the fuse it went out. Employe relit the fuse an' then got away to the proper distance from the hole an' waited fer the explosion. Time went by an' nothin' happened, so thinkin' the fuse had gone out a second time he went over to relight it. As he was leanin' over the hole the dynamite exploded an' he was hit in the face by the rocks and debris. Employe should have waited five minutes, and until all smoke had cleared away, an' then another blast hole parallel to the first hole an' two feet from it should have been drilled.

Employe was sharpenin' a steel drill by holdin' a blacksmith's dolly, which a helper was poundin' down over the end of the drill with a hammer. A small piece of steel chipped off one of the tools and lodged in his left eye, injurin' it seriously enuf to cause its removal. Employe did not have any goggles! 'Nuff said!

No matter how little the distance is that you fall, the fall may injure you seriously. Take fer instance, the case of a cable splicer who was working on a pole without his safety belt, having his left foot on butt pole step and his right knee restin' on first iron pole step. His left foot slipped, causin' him to whirl aroun', fallin' jist four feet to the concrete pavement—head first! His skull was fractured.

Two linemen were replacin' covered wire an' splittin' party lines. One was runnin' out the covered wire on the ground while the other climbed a 15-year-old 25-foot chestnut pole, which carried five pairs of covered wire, to replace the old wooden pole brackets with standard drive hooks. As he was placin' the second drive hook the pole fell takin' him along. Investigation showed that the pole was rotted at the bottom an' as there was no pike poles on the truck, it hadn't been pike tested.

Suppose you had been one of the fellers in one of these accidents. Would sure have been tough, wouldn't it? With times like they are you nor I can afford to have an accident. Watch everything and do every job the Safe Way.

Remember, the best insurance against an accident is "Safety First."

I once heard an' ole telephone man say: "It ain't the poles nor instruments, the public pay, but the close-up cooperation that makes us win the day. It ain't the individual but the company as a whole an' the everlasting teamwork of every bloomin' soul."

Let's every bloomin' one of us get goin' in this war against "Ole Man Accident." If you see an employe doin' somethin' carelessly, show him the safe way. If you don't know the safe way, ask yer boss.

Are we goin' to stop "Ole Man Accident" or shall he rule us during "32" as he has in previous years?

Mirabeau once said: "Why should we call ourselves men, unless it be to succeed in everything, everywhere. Say of nothing 'This is beneath me,' nor feel that anything is beyond our powers. Nothing is impossible to the man who can will."

Are we goin' to say it's impossible to stop "Accident"?

Well, I gotta' be ramblin'. Keep up yer good work an' if you get an idea fer "Safety" let me hear 'bout it. So long!

Telephone Cables in Marshland Endangered by Shifting Mud.

Shifting mud has been threatening underground cables for almost two years along the north shore of Long Island, New York. The trouble first began when high-

way construction forces started widening the Northern boulevard between Bayside and Douglaston.

In January, 1930, when the highway men began driving foundation piles preliminary to the erection of a new bridge, it was found that the five submarine cables carrying 5,000 telephone circuits would have to be removed. They were successfully placed 150 feet upstream.

Then, as the filling in work began along the highway, it was found that the road was rapidly moving upstream. This encroachment meant that the old subway had to be abandoned for a distance of 3,300 feet and a new one constructed in its place on a higher level corresponding to the fill. But before the new subway could be built the wall of the old subway began to crack and the cables stretched from the pressure of the fill upon the marshland.

A fight against time as well as nature followed. A huge trough was laid across the marshlands as a temporary subway. Approximately 18,000 feet of new cable had to be drawn through this 3,300-foot trough and new conductors spliced to take the place of the threatened cables in the old subway.

Then trouble came in a new form. The 70,000 tons of earth in the highway fill caused the bottom of the creek on the upstream side to rise ten feet, upsetting the new arrangement of the cable and making the job of constructing the new subway even more difficult. However, by maneuvering the temporary trough to a new position the work is progressing satisfactorily and telephone service continues.

Modern Methods as Compared with Early Plant Practices.

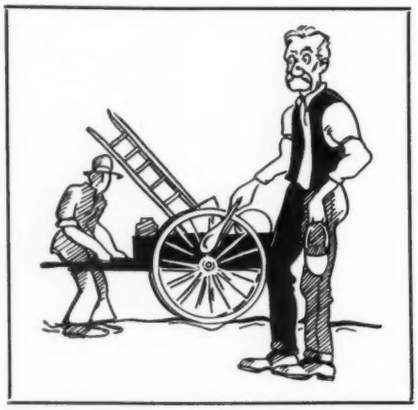
By An Old Cable Splicer.

I am just an old worn-out cable splicer but claim that I have had my moments. While I am not seeking any niche in the Hall of Fame I do believe that I have had just as thrilling a life as many a modern rum-runner. In a way I am glad that I served my time in the telephone game back in the days before modern safety methods removed the danger, and machinery most of the work.

I have had some mighty narrow escapes and I guess I must be somewhat lucky, even though I could never win at poker. I have had a few broken bones and wear several scars on my hands, burns from hot metal, which I will carry to the grave. Even so, it has not been a bad life's work and I really do not have any regrets. As compared to the standards of today, I do not think I was ever much of a cable splicer; but according to the standards of the time when I was in my prime, I sure made them sizzle.

The other day a young chap told me he could splice a 1200-pair cable in nine hours, and I admitted that I could not splice one in nine days. Then I told him we did not have as many lost pairs in my days either and he replied: "You didn't have any No. 24-gauge cable either."

I must admit there were a lot of things we did not have that are proving their



Pioneer Cable Men Worked Under Trying Circumstances as Compared with Modern Practices Now in Use.

worth today. We did not have gas to test a new splice to make sure that it was water-tight. We just waited for the first rain and then were not surprised if a few hundred numbers came in permanent.

We did not have a close-fitting tent to clamp on the messenger and tie down around the platform to keep out the wind, cold and rain. We hung up a square piece of canvas as best we could, and it generally blew away just when we needed it most. We did not have trouble-proof blow torches and furnaces as you have.

We used paper sleeves instead of the present wool variety which will bind close and permit the use of a smaller lead sleeve. If we ran out of paper sleeves we just went down to the nearest soda fountain and bought a bunch of straws and cut them into the proper lengths and they made a working substitute.

Our transportation was generally a two-wheeled pushcart or in the larger exchanges, a horse and buggy. A good helper was one who would not get stuck with the loaded cart between jobs, even though the way might be sandy.

We did not have large, airy manholes as you have today, drained into a storm sewer. Neither did we have a power-operated pump to ventilate them, pump water out or blow in a stream of heated air on a cold winter day. We had a form of duct rod which generally came uncoupled in the middle of a section.

We used soapstone or grease as a cable lubricant and did not have the special lubricants with their many advantages which you enjoy today. Neither did we have reliable cable grips but tied the pulling line to the end of the cable with No. 14 iron wire. The losing of cables in duct lines was frequent.

Yes, when I stop and ponder I realize that you have many things today to be thankful for. Even the telephone service is better, and small wonder it is. I am proud to admit that the art of cable splicing has advanced far beyond the wildest dreams of us old-timers. There is even a splicing machine in use. My only wish is that you will give us credit for contributing our part to the industry.

Important New Standards and Projects Affecting Industries.

Bancroft Gherardi, vice-president of the American Telephone & Telegraph Co., was re-elected as president of the American Standards Association for the year 1932 at the annual meeting of the association held in New York on December 9.

Other officers, who were also re-elected, are: Cloyd M. Chapman, consulting engineer, United Engineers & Constructors, Inc., New York, vice-president of the American Standards Association and chairman of the ASA Standards Council, and John C. Parker, Brooklyn Edison Co., Brooklyn, N. Y., vice chairman of the ASA Standards Council.

Developments in national and internation standardization work were reported at the meeting by both Mr. Gherardi and Mr. Chapman, who reviewed the progress of industrial standardization during 1931. Twenty-seven new national standards affecting almost every important industry in the United States have been completed by national committees of technical experts working under the association's auspices since January 1, 1931.

Mr. Gherardi also reported the beginning of 13 new national standardization projects affecting mechanical, electrical, mining, iron and steel, and other industries.

In an effort to secure a greater degree of international uniformity in certain industrial standards approved by national standardizing bodies of the 18 countries represented in the International Standards Association, work on many projects is now going forward in international committees, Mr. Gherardi stated. Important new international projects, the initiation of which is now being considered, cover the standardization of grinding wheels and methods of testing petroleum products and lubricants. The American Standards Association holds the secretariat for the latter project.

The advancement of standardization work in the electrical industry has been promoted during the past year, Mr. Gherardi said, by the organization of the Electrical Standards Council to correlate the standardization activities of the entire industry under the auspices of the American Standards Association.

"Evidence of the growing importance of national standards," said Mr. Gherardi, "is shown by the requests from various industries for approximately 45,000 copies of various standards the past year."

Hawaii Linked to World's Telephones

Regular Telephone Service Opened Between the Hawaiian Islands and North America—New Methods and Equipment Make Transpacific System Especially Noteworthy—Interesting Details of California Sending and Receiving Stations

Modern magic, with electrical engineers in the roles of wizards, has brought the Hawaiian Islands as close as the nearest telephone. "Sky waves," rivaling Aladdin's fabled genii, carred the voices of government, business and telephone leaders

Equipment for Final Stage of Amplification. Merren Radovan Holds One of the Two-Foot Vacuum Tubes.

across the Pacific in 14 calls, which marked the opening of regular transpacific radiotelephone service between Hawaii and the United States on December 23.

The calls between Washington, D. C., San Francisco, Seattle, Portland and Los Angeles and Honolulu, varied in length from 2,000 to 5,000 miles, and covered 100,000 miles in about 30 minutes. The transmission was excellent, comparing favorably with a local call by land lines.

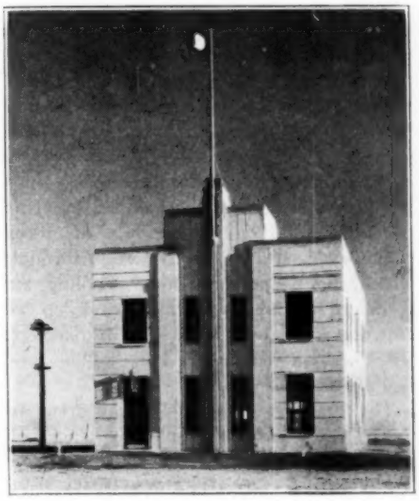
This success rewarded the months of planning, installation and testing by the Transpacific Communication Co., Ltd., a subsidiary of the American Telephone & Telegraph Co. which operates the California sending and receiving stations; and the Radio Corp. of America, which maintains the Hawaiian stations. The mainland stations connect with Bell System land lines, and those in the Islands join Mutual Telephone Co. circuits.

The Mutual Telephone Co. serves the 25,000 telephones in Hawaii. It interconnects four of the islands by short-wave radiotelephone circuits. Transpacific radiotelephone service is, therefore, available to telephone users in Hawaii, not just to those in Honolulu.

Although similar to the apparatus used for transatlantic and South America service, the many new methods and equipment innovations introduced make the transpacific system especially noteworthy.

The new type antenna, the horizontal double-V, described in the December 12 issue of TELEPHONY, has proved thoroughly satisfactory for long distance short-wave transmission. Constructed of wooden poles, strung with copper wire, this diamond-shaped antenna combines low construction cost and great power economy. It was developed in 1931 by the Bell Telephone Laboratories, and was used for regular commercial service for the first time in December for the Hawaiian circuit and the New York-Rio de Janeiro channel.

The sending antenna, at Dixon, Calif., is "aimed" at the receiving antenna at Koko Head, 12 miles from Honolulu. The short waves are projected from the antenna backed by over 10,000 volts. They leave the antenna at an angle of 10 to 30 degrees above horizontal, and strike the Kennelly-Heaviside layer of ionized gases, about 200 miles above the earth's surface, and are then deflected to the distant station 2,000 miles from Dixon.



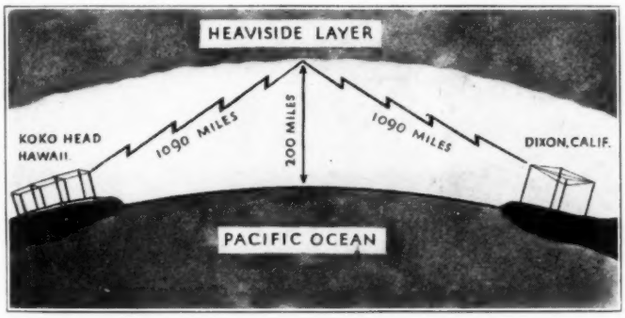
View of the Building at Dixon, Calif., Housing Transmitting Equipment for Hawaiian Transpacific Telephone Service.

Flat land is desirable for both receiving and sending antennas of this type, which have a maximum height, at Dixon, of but 70 feet, as compared with the 185-foot towers at Lawrenceville, N. J., used for transatlantic service. The entire Pacific Coast was combed for satisfactory station locations, and extensive field tests were made. As a result a site near Dixon, 20 miles southwest of Sacramento, California's capital, was chosen for sending; and Point Reyes, 35 miles north of San Francisco's Golden Gate, was selected for receiving.

The land surrounding Dixon stretches away in a perfectly level expanse, as far as eye can reach. The tract surrounding the station is a mile square, to permit expansion, and has a large population of sheep and jack rabbits.

The Pt. Reyes receiving station is thoroughly isolated on a wild, treeless seacoast, accessible, however, to telephone connections and a good road.

The Dixon station uses frequencies be-



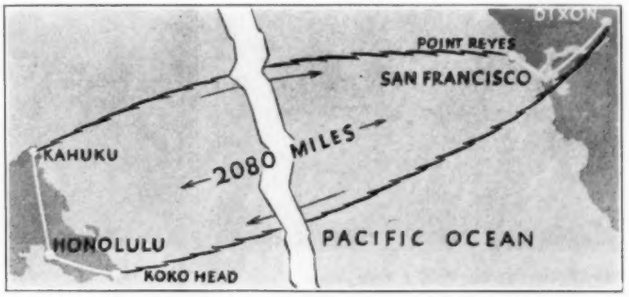


Illustration of the Application of the Heaviside Layer of Ionized Gases Which Makes Practical Use of "Sky Waves" Possible—Chart Showing Voice Routes Between Hawaii and California. The Land Lines from Transmitting and Receiving Stations, Which Are Located in Isolated Places, to the Operating Centers at Honolulu and San Francisco, Are Shown in White.

tween approximately 7,000 and 21,000 kilocycles, corresponding to a range of about 14 to 40 meters. Should a wave length less than 12 meters be used, the "sky waves" would not be deflected by the Heaviside layer, but would pass through it, thus losing the directional value of the antennas.

The two-foot, double-ended vacuum tubes in the Dixon transmitter use great power to amplify the voice current millions of times. Water-cooling is necessary to keep eight transmitter and six rectifier tubes at a working temperature of 120 degrees.

An elaborate system, similar to an automobile water-cooling mechanism, prevents overheating. It is made up of three radiators each five by five feet, through which the water circulates. Cooling air is driven through the radiators by three blowers, each about three feet in diameter. The system employs 150 gallons of double-distilled water.

The rectifier supplies direct current to the transmitter for the final two stages of amplification of the voice current. The rectifier delivers this power at 10,000 volts through its water-cooled tubes. The last stage of amplification at the peak has a power output of 20,000 watts.

The Dixon station's line terminal compartment has been called the "copper room." Its walls, floor and ceiling are lined with sheet copper, and the windows are screened with a fine mesh of this metal. Wires connecting the station with the nearby long distance cable to the San Francisco control room lead to this room, which also houses a testboard and vacuum tube repeaters.

The copper shielding is necessary because of the great power used in amplification, and insures that the telephone lines terminating in the room shall be free from electrical disturbances from outside.

A Section of Transmission "Line" Connecting the Point Reyes Station to the Antenna. It Consists of a Small Brass Tube Insulated from a Larger Brass Tube.

The Dixon plant has its own substation for stepping down alternating current from 11,000 to 2,300 volts. Three motor generators turn the alternating current into direct current. Oil circuit-breakers, and a complicated safeguard system requiring five keys to enter rooms where high-voltage equipment is located cut the danger from natural hazards and human mishaps to a minimum.

Although it now houses but one radiotelephone receiver, the Point Reyes building is designed to accommodate additional apparatus. The receiving set has eight stages of amplification: two of radio-frequency; six of intermediate-frequency; and one of audio-frequency amplification. "Fading" is minimized by an automatic volume control. The actual volume going into the telephone wires to the San Francisco long distance room is adjusted by vacuum tube repeaters in the terminal room.

Two sets of small storage batteries furnish power for the receiver. When one is in use, the other is on charge.

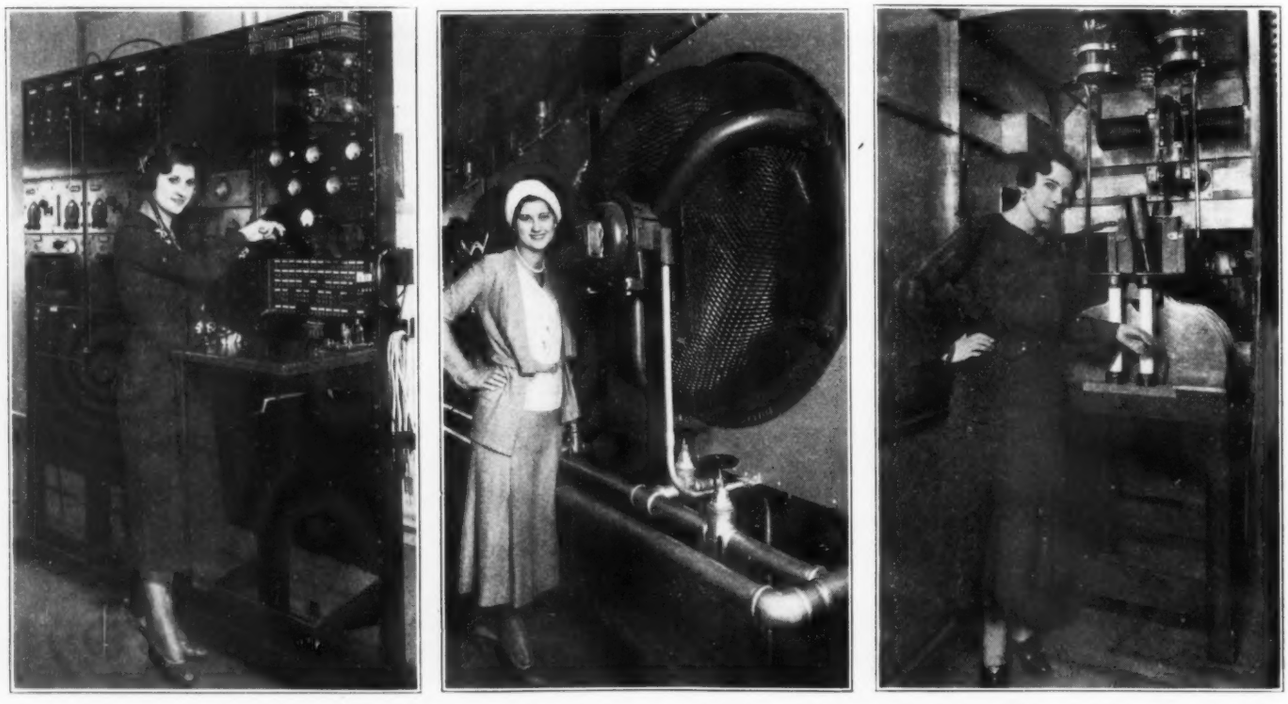
To be accurate, the entire equipment at Point Reyes is used for receiving. However, the actual receiver cabinet—corresponding to the transmitter—measures eight by seven feet.

The Point Reyes station has duplicate receiving antennas. One is located about 500 feet northeast of the building, and the other south. The antennas will receive on two frequencies; 16,195 kilocycles and 7,535 kilocycles. The "V" type antennas are simpler even than the transmitting antenna at Dixon. Each is made up of four poles, with a single copper wire at their tops. The antennas are "aimed" to receive only from Hawaii.

The concentric copper tubing used to connect the antenna with the receiver is placed underground. This is a new departure, as formerly the transmission lines for this purpose have been supported above the ground on short stakes, and have followed a sinuous curve to allow for expansion.

The San Francisco terminal control room is located in the long distance building of the Pacific Telephone & Telegraph Co., 333 Grant avenue. The equipment in this room consists of a monitoring and testing position with volume control apparatus, vodas, delay and privacy equipments with their associated power panels.

"Vodas" is one of the newest words coined by science. It is made up of the



The Transpacific Radio-Telephone Receiving Set. Miss Radovan Is Adjusting the Volume Indicator—Miss Radovan Illustrates the Size of One of the Three Blowers of the Water-Cooling System for Cooling the 14 Large Vacuum Tubes Used in the Transmitter and Rectifier Units—Compare These 14-Inch Condenser Plates, Pointed Out by Dolores Culver, with Your Home Radio. These Are 3/8-Inch Thick and Are Used in the Final Stage of Tuning the Big Transmitter at Dixon, Calif.

first letters of the words comprising the descriptive name for the equipment: "voice operated device, anti-singing." The vodas equipment consists of relays, operated by the voices of the persons talking by radiotelephone. The sending line to the radio transmitter is automatically short-circuited when the distant speaker is talking. The receiving line to the radio receiver is short-circuited when the local speaker is talking.

The "delay" machine "boxes up" the voice by making it wind its way through the equivalent of about 2,600 miles of wire. The machine resembles a pile of 26 shoe boxes. These boxes each contain many coils of wire tightly wound on iron, which resists the electric flow. The voice cannot be heard until it travels through them all. The vodas and delay equipment are of great value in assuring clarity of transmission.

The privacy equipment is really a "voice-inverting" device, which assures absolute privacy on all radiotelephone conversations. The machine is built on the fact that every spoken word sets up air vibrations numbering hundreds per second.

The inverter simply "inverts" these vibrations by speeding them up or slowing them down. A low voice at 250 cycles becomes a squeak at 2,750 cycles, with occasional low grunts, due to overtones. A school girl's giggle becomes a roar. A deep chested roar turns falsetto.

The inverter would make the words "Pacific Telephone Co." sound like "fathith-uk play-a-feen crink-a-nope." "Mountain" would be "jaycut."

According to a statement of a world-famous expert on secret codes, ciphers and cryptography, such inventions of the Bell Telephone Laboratories, with their refinements and extensions, are the only way known by which to communicate secretly by undecipherable code.

The Hawaiian circuit wires run from the Grant avenue control room to the regular San Francisco long distance switchboard. There an operator, who handles transpacific service, has before her a switchboard section containing connections with all long distance lines running into the city from all parts of North America.

The Pacific is the third ocean conquered by regular telephone service since 1927, when the New York-London circuit was opened by the American Telephone & Telegraph Co. and the British Post Office. The principal world channels are now the New York-London; New York-Buenos Aires, New York-Rio de Janeiro, and the London, Paris and Berlin links to the Far East, Australia and South America.

Circuits are proposed to Tokyo, Manila and Sydney. Should the Australian city be connected with the Pacific Coast, the first direct telephone circuit around the world, over 21,000 miles long, would be possible.

Answers to Traffic Questions Presented on Page 18.

1. It is my understanding that left-handed operators are not employed by the larger companies.
2. A two-second ring.
3. That depends. For example, you are holding a cord and before it is used a disconnect appears on the pair of cords to the left of this cord and the connection is taken down, this cord is then used instead of the cord you were holding.
4. Yes.
5. No. We do not call a subscriber back and ask him if we may try his call again after he has cancelled it.

HARMONY

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

The folks we like best are those who seem to harmonize with us in spite of our temperament, and with everyone else we know, and they know, in the same way. That appears to be taking in a great deal of territory, doesn't it? Is getting along with folks a gift? We sometimes wonder. People who belong to this class appeal to the pleasant side of our minds. They do not belittle themselves one iota in their contacts with us. Their opinions ring true.

They always seem to get along with folks in their home, office, anywhere in fact, regardless of dispositions, tastes, viewpoints, religion, age and walk in life.

We do not know how they do it but we have probably observed that the things we like in such folks, whether they sit in the chair of the president of our company, or stoke the furnace, are these and more:

They do not think of their own convenience, comfort, and viewpoint *first.*

They do not resort to argument to make us see as they do.

They seem to understand the contradictions in our nature that often get us in trouble and do not drag them out and belittle us.

They exhibit a spirit of helpfulness even in very small matters.

They not only give close attention to business but also show an interest in it.

They overcome obstacles of unfriendliness and moroseness by showing a friendly spirit, regardless; do not seek an explanation, but if one is offered accept it in good grace.

They never carry a tale from one to another.

They do not backbite.

They stick to their ideals.

MORAL: Harmony untangles misunderstandings, cools anger, regulates action, enlightens and uplifts where once misunderstanding prevailed.

How Telephone Company Sold Toll Service at Convention.

How the Southern Bell Telephone & Telegraph Co. pioneered in a service for 5,000 visitors to the American Dental Association meeting in Memphis in October, is told in a recent issue of Southern Telephone News.

Six weeks in advance of the convention, District Manager Frank Flournoy compiled a list of the 437 delegates. A card was sent to each informing him of the long distance rates at various hours, in the event he wished to keep in touch with his home.

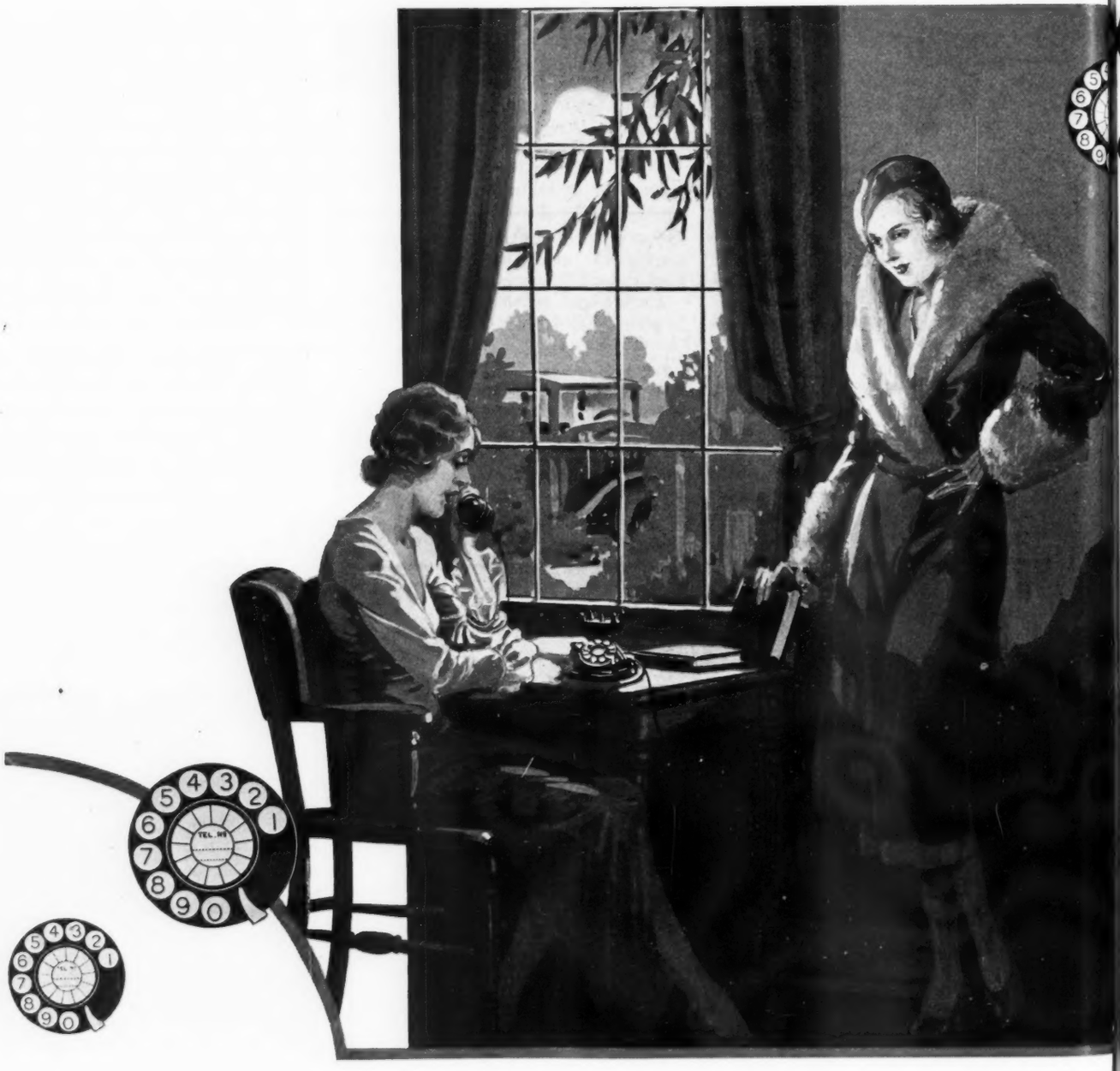
With the assistance of Ralph E. Logsdon, convention director of the Memphis Chamber of Commerce, the telephone company was later furnished through the convention bureau's registration desk with names and hotel room numbers of the 2,222 persons attending who were registered at leading hotels. The next morning each found in his key box at his hotel a copy of the special rate card.

Results checked showed the card sold 1,389 long distance calls during the convention. Revenue to the company was $2,103.95.

Nebraska Sleet Storm Damages Despite Heavy Construction.

Northwestern Bell Telephone Co. reports show that the sleet storm of a few weeks ago in Nebraska was confined, so far as that company is concerned, to the Norfolk district and the northern half of the Omaha district.

In spite of the Northwestern Bell's new and heavy construction, toll wire lines were badly damaged. In one 40-mile stretch nearly 1,000 wire breaks were found. More than 1,700 exchange stations were put out of service for a time. Repair crews from Iowa were imported and also a few borrowed from the toll forces of the A. T. & T. Co.



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When People Compare Their Telephone Service... What Do They Say of Yours?

A WOMAN apologizes to her guest for the telephone service—and bites her lip at the thought of what she will say the next time she pays her bill!—A business man resents an outsider's complaint of poor telephone service. Somehow it suggests lack of system in his own office, backwardness of his city . . . and he votes against any telephone company proposition which may come up at the next city council meeting!

Thousands of times each year such things happen—or don't happen. Your subscribers are comparing, either consciously or subconsciously, their telephone service with that in other cities, for better or for worse. There is bound to be a strong public opinion either for your service or against it.

There is today one permanent means of securing public good-will and satisfied users—Strowger Automatic operation. Rendering the finest telephone service obtainable, it creates favorable opinion, eliminates the dissatisfied user, increases the use of telephone service generally and promotes expansion and new business.

With public good-will assuming increasing importance every day, why overlook it? It will pay financially, as well as in every other way, to include it in future calculations. Write today, and let our engineers show you, with facts and figures, just what Strowger Automatic equipment can do for you.

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Here and There in Telephone Work

Not the Vacation Season, But Telephone Man Catches Big Fish.

"A great angler" is the expression used by "Pete" Winemiller, of the Stromberg-Carlson Telephone Mfg. Co. in sending in the accompanying snapshot of J. L. Raidt and his most recent conquest. Mr. Raidt is auditor of the Rio Grande Valley Telephone Co. with headquarters at McAllen, Texas.

Photographic Evidence of "What a Real Fisherman Can Do."

The fish is a silver tarpon that was caught by him at Point Isabel, Texas, on November 1. The exact time was 5:45 p. m. This fish was 5 feet 9 inches long, and it weighed approximately 160 pounds. We've heard the expression, or rather boast, that a man "can whip his weight in wildcats." Judging from the photograph of the fish and Mr. Raidt, Joe has whipped "his weight in fish."

An Unusual Circuit for Testing Ringers Through Cable.

Some time ago our company built a new storeroom and garage, located about one mile from the central office. It was desired to furnish ringing leads to the storeroom, so that the storekeeper could test and repair instruments.

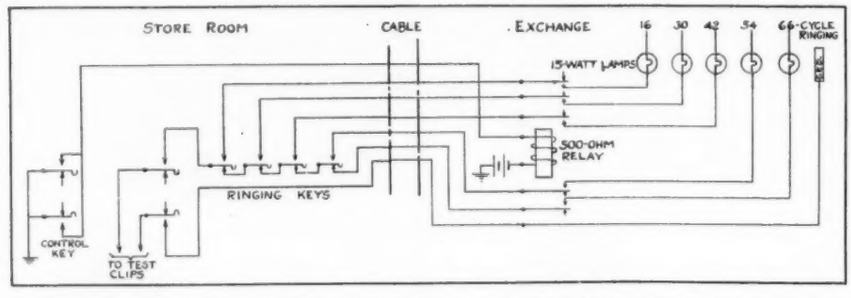
However, as we use five-frequency ringing (16, 30, 42, 54 and 66 cycles) it was found that to have this current constantly in the cable, it "noised up" the cable to such an extent as to be objectional.

At the storeroom we had a small panel board, equipped with a voltmeter and keys for making tests, so the writer worked out the scheme shown in the accompanying diagram.

The lamps and relay were mounted on the relay rack in the central office and a control key was installed on the panel board at the storeroom.

The storekeeper now has all ringing frequencies, but only while he is testing an instrument. This has given entire satisfaction and keeps the induction out of the cable. The relay used in this instance was 500 ohms, slow release, on 40 volts battery.

Ashland, Ky. J. R. SPIVEY, Wire Chief,
Ashland Home Telephone Co.



This Simple But Unusual Circuit Was Devised So That Ringing Current for Testing Could Be Supplied with Minimum Inductive Interference in Cable.

P. B. X. Current Supply; Utilizing Central Office Power (Ctd.).

By JOHN A. BRACKEN.

It is a known fact that if two or more conductors leading from the central office battery distributing panel to supply the operating current for a group of two or more P. B. X. switchboards are very long, the difference of potential or electrical pressure between them will drop in proportion to their length, if the switchboards are an equal distance apart. If the switchboards are grouped in a certain locality the drop will be more apparent.

This drop in electrical pressure is due, in the first place, to the electrical resistance of the P. B. X. current supply conductors. The greater this resistance is, the greater the voltage drop will be. Again, with a given resistance of conductors, the voltage drops in proportion as the current flowing is increased.

A certain amount of voltage drop is also due to leakage; that is, any loss or escape of the battery current by leaking to the earth or between conductors. The formula for voltage drop is a combination of Ohm's law and the expression for the resistance of a conductor. Thus, the difference in voltage, or the voltage drop on a circuit, is equal to the amperes times the resistance.

It is apparent then that for a given current, the voltage drop in a pair or more of current supply conductors to the P. B. X. switchboard is proportional to their resistance. For this reason conductors of large diameter will cause a less voltage drop than conductors of a smaller diameter, since their resistance is inversely proportional to the cross sectional area.

However, the size of conductors selected is limited by the consideration of cost. It is common practice to use conductors having a resistance such as will not cause a voltage drop of more than 2.5 per cent of the current supply voltage. As an example: Consider a P. B. X. switchboard at

FREE
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A JOB FOR A MAN AND YOU'D RATHER HAVE ONE WITH A FAMILY WE'LL SEND ONE OUT!
SEWING
CALL US FOR WILLING WORKERS
PHONE 91
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EMPLOYMENT

By "BUCK."

My buddy's boss has had hard luck; in spite of all his grit an' pluck in th' ole "Repression" he got stuck; so, my bud got laid off.

Although my buddy'd saved some mon, by golly, when his job was done, in jes' a while his cash was gone an' empty was his trough.

Though, from the day he got let out, he'd been job-huntin' all about, his chances all seemed "up the spout"—he didn't land a thing. He'd tramped 'til he was tired an' lame, but ev'rywhere 'twas jes' the same; this durned ole fickle Fortune dame fer him had jes' a sting.

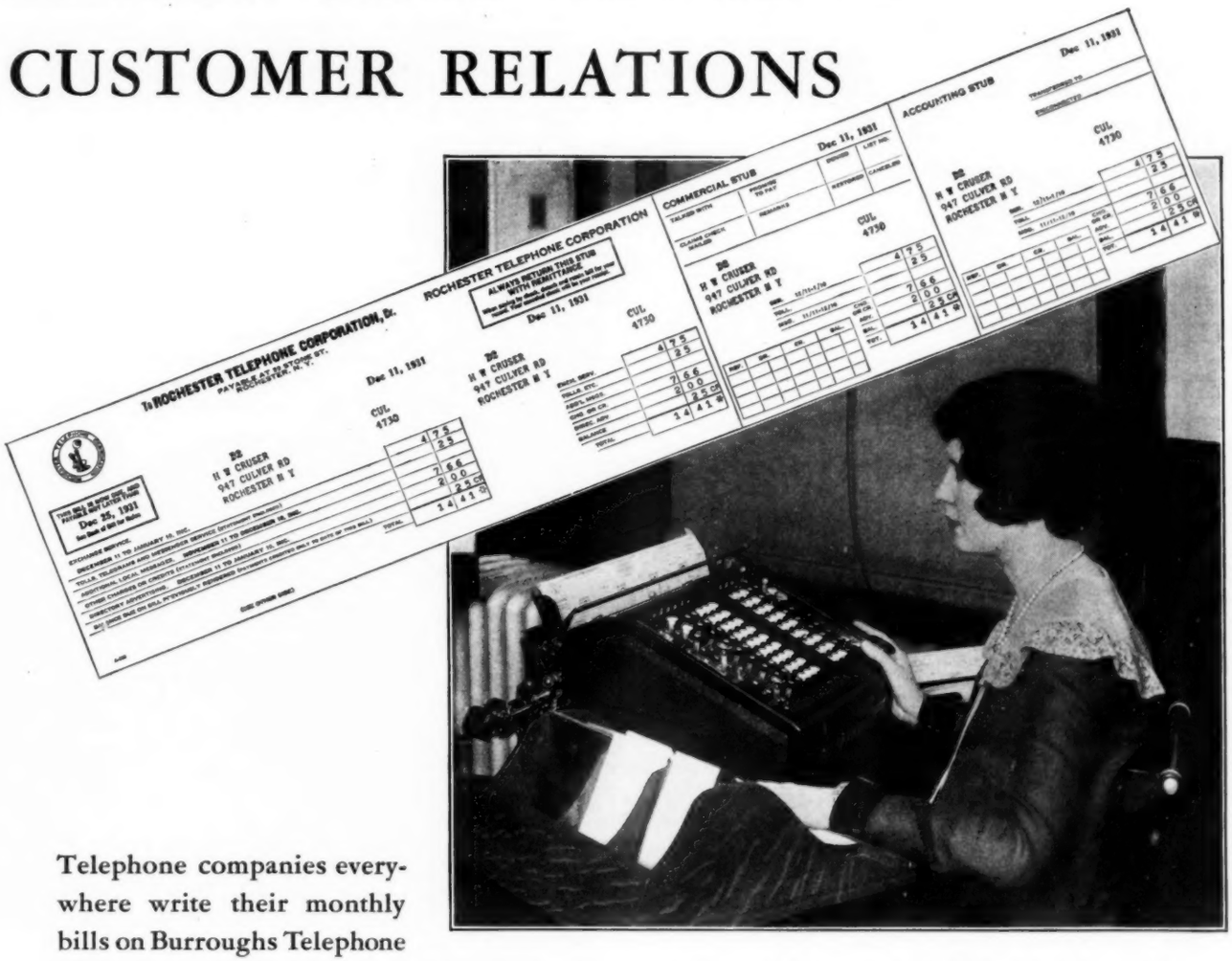
An' others, too, were in his fix, apoundin' asphalt, cement, bricks, jes' like a bunch o' cops or "dicks"; but, jobs? They jes' warn't none!

Then on this scene so fulla gloom, an' when it seemed the crack o' doom would bust, some flow'rs begun to bloom. That's when the town begun to function with a wood-pile, then a sewin'-room, et- cet'ra. When the women needin' work, or men, applied, they hired 'em!

Durn it! We're all fer charity and grace, an' in this world they've one big place!

In th' able-bodied folks's case, by heck, they'd ruther earn it!

BILLS THAT IMPROVE CUSTOMER RELATIONS



Telephone companies everywhere write their monthly bills on Burroughs Telephone Billing Machine, turning out a large quantity of work with astonishing speed. The machine not only reduces billing costs, but also provides a neater, more accurate bill that improves customer relations.

In writing the bill the machine does most of the work automatically. The operator enters the figures *once only*—the machine then automatically repeats the printing of them on the cashier's stub, the commercial stub and the accounting stub without further attention on the part of the operator. There is less work for the operator, fewer chances for error, no time lost in posting.

The machine automatically accumulates grand totals of debits and credits against which to check predetermined totals for proof of billing.

For a demonstration or complete information, call local Burroughs office, or write—

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DETROIT, MICHIGAN

Burroughs

the far end of current supply conductors 1,000 feet long, the voltage of supply 24 volts, and the current to be transmitted 0.50 amperes. Allowing a voltage drop in the conductors of 2.5 per cent—equal to 2.5 divided by 100 times 24 which equals 6 volts—the total allowable resistance of the conductors is $R = E/I = 6/0.50 = 12$ ohms.

The resistance per foot of the conductors to be used is, therefore, $12/2000 = 0.006$ ohms, since the total length of conducting wire from the central office to the P. B. X. and return is 2,000 feet.

The resistance then of the current supply conductors is very important as it causes a loss of working power to the P. B. X. switchboards, and the resistance is great or small according as the conducting wires are small or large, or long or short, respectively.

A conductor, for instance, of a certain size, 500 feet long, will incur a drop in voltage just twice that due to a wire 250 feet long. Also a wire of a given sectional area will incur twice the drop due to a wire of double the cross sectional area.

In P. B. X. current supply circuits where the conductors are of even size the voltage drop will be even. In others, where the sizes vary, as in the case of a combination of gauges in cable conductors, the drop in voltage will be greatest where the wire is of the smallest gauge. It is best practice to select conductors or a group of conductors that will keep this drop in voltage, or loss, down to approximately 2.5 per cent of the total voltage.

The proportional drop in voltage becomes less as the E. M. F. in the supply circuit is increased, due to the effect of E. M. F. upon the amount of copper required in the conductors. That is, the higher the E. M. F. at which a P. B. X. switchboard is operated from the central office, the less is the weight of copper wire required.

A practical record card for keeping information regarding the power data on each P. B. X. battery installation is shown in the accompanying illustration. This record card may prove to be quite valuable as a quick reference.

CENTRAL OFFICE _____
DISTRICT _____ AREA _____
CITY _____

PRIVATE BRANCH EXCHANGE POWER DATA

TYPE - MANUAL BOARD _____
TYPE - DIAL BOARD _____
DATE INSTALLED _____

NAME _____ ADDRESS _____ TELEPHONE NO. _____

NUMBER OF CABLE CONDUCTORS FROM THE CENTRAL OFFICE TO FLOAT STORAGE BATTERY LOCATED AT THE P.B.X.				NUMBER OF CABLE CONDUCTORS FROM CENTRAL OFFICE TO SUPPLY BATTERY POWER DIRECT TO THE P.B.X EQUIPMENT.		NUMBER OF CABLE CONDUCTORS FROM CENTRAL OFFICE TO SUPPLY RINGING POWER DIRECT TO THE P.B.X. EQUIPMENT.	
CABLE NO.	CABLE TERMINAL NO.	STORAGE BATTERY NO. CELLS	STORAGE BATTERY TYPE	CABLE NO	CABLE TERMINAL NO.	CABLE NO.	CABLE TERMINAL NO.

NO. OF PAIRS METALLIC	NO. OF PAIRS GROUNDED	LENGTH IN FEET	GAUGE	RESISTANCE MEASUREMENTS C.O. TO P.B.X. ALLOWED	RESISTANCE MEASUREMENTS C.O. TO P.B.X. MEASURED	NO. OF PAIRS METALLIC	NO. OF PAIRS GROUNDED	LENGTH IN FEET	GAUGE	RESISTANCE MEASUREMENTS C.O. TO P.B.X. ALLOWED	RESISTANCE MEASUREMENTS C.O. TO P.B.X. MEASURED	NO. OF PAIRS METALLIC	NO. OF PAIRS GROUNDED	LENGTH IN FEET	GAUGE	RESISTANCE MEASUREMENTS C.O. TO P.B.X. ALLOWED	RESISTANCE MEASUREMENTS C.O. TO P.B.X. MEASURED

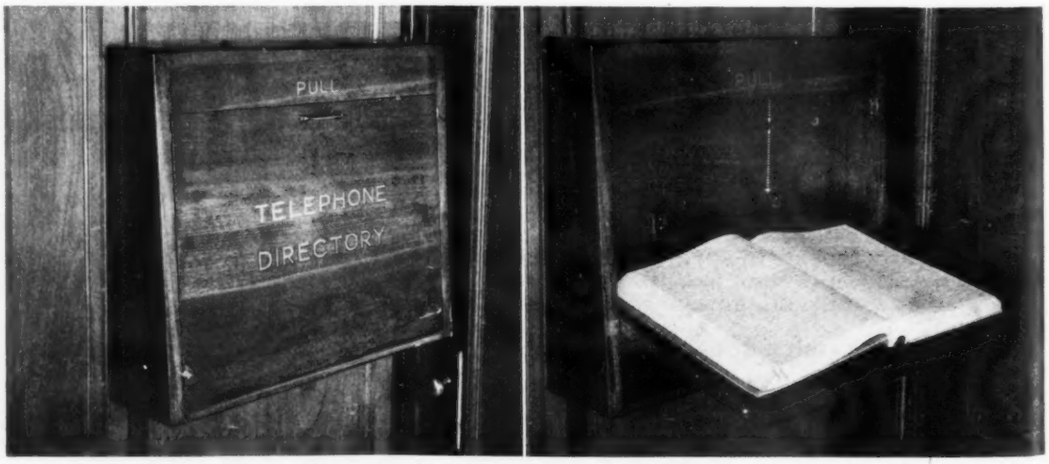
REMARKS _____

Type of Record Card Which Will Prove Valuable Source of Information on Private Branch Exchange Power Data.

New Directory Cabinet for Use Where Space Is Limited.

In the October issue of The Transmitter, the magazine of the employes of the Chesapeake & Potomac Telephone Co., there appeared a reproduction of a new directory cabinet developed by the company. This cabinet is particulary designed for use where lack of space frequently presents a difficult problem in providing proper telephone directories for public telephones. The Chesapeake & Potomac company has made an effort to overcome this difficulty by designing special arrangements where the regular equipment cannot be used.

In the particular location illustrated, the only available space for a directory was between two doors. The closed type of directory cabinet permits the unhampered use of the doors which would be blocked if the regular equipment were used. This particular type of directory cabinet is said to reduce wear and tear on the directories considerably.



New Directory Cabinet Developed by the Chesapeake & Potomac Telephone Co. for Use Where Available Space Is Unusually Limited. It Is Attractive in Appearance as Well as in Compactness.

Railroads Increase Use of Telephone for Train Operation.

The telephone is supplanting the telegraph in the operation of the nation's railroads, more than 154,000 miles of road using the more modern service on January 1, 1931, as contrasted with but 99,000 miles still employing the telegraph at that time, according to a statement of the American Railway Association transmitted to the Intersttae Commerce Commission.

"Use of the telephone as a means of regulating the movement of the thousands of trains that daily move over the rails of the railroads of this country is decreasing," the statement says.

"Reports just received from the railroads show that on January 1, 1931, telephones were used over 154,075 miles of road compared with 99,047 miles which continue the use of the telegraph.

The extent of the increase in the use of the telephone for the transmission of train orders is shown by the fact that on January 1, 1920, the miles of road on which the telephone was used totaled 119,554. On the same date, the telegraph was being used on 134,667 miles of road.

Train orders prior to 1908 were handled almost exclusively by means of telegraph, but since that time there has been a steady increase in the use of the telephone by the railroads for the transmission of train orders, so that now nearly two-thirds of the total rail mileage of this country make use of that means of communication instead of the telegraph."

LONDON
ITISH EMPIRE

c Telephone Exchange
and installed by
WOOLWICH, ENGLAND.

HOUSES OF PARLIAMENT and no fewer than 27 Government Departments.

The Whitehall Exchange is of great interest as being the first automatic exchange to be housed in a building scheduled as an "Historical Monument". The original building, Harrington House, has associations with Wren and dates back to the year 1690.

The Exchange has a capacity for about 8000 lines.

The World's most efficient Telephone

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Perth, Wellington, Auckland, Tokyo, Shanghai, Tientsin, Mukden, Harbin, Calcutta, Bombay, Madras, Colombo, Ipoh (Perak F. M. S.), Kuala Lumpur, Singapore, Penang, The Hague.

When communicating with Siemens Bros & Co., Ltd., please mention TELEPHONY.

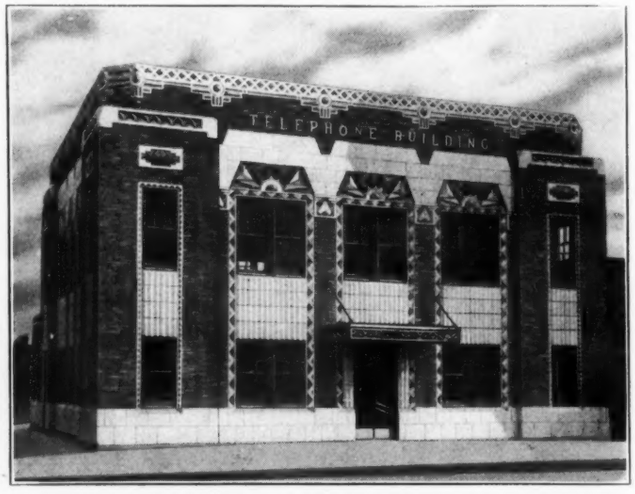
Something New in Exchange Buildings

Indian Symbols and Mythology Incorporated in New Telephone Building at Goodland, Kans.—Telephone Poles, Trimmed and Decorated, Used for Ceiling Beams—Interesting History of Exchange—Description of Equipment Installed

By Dan Hughes,

Advertising Department, United Telephone Co., Abilene, Kans.

Pioneer telephone men were not greatly concerned with the finer points of the building that housed their equipment. Their effort was extended to get subscribers to use and pay for service at any cost. A vacant store front, residence rooms or upstairs loft was usually selected as a location for the central office. If some of these same pioneers could visit Goodland, Kans., and compare the new exchange building just completed there with early-day offices, they would come away with complete satisfaction concerning the advances made in telephony.



Distinctive Indian Art Was Colorfully Worked Into the New Telephone Building Constructed by the United Telephone Co. at Goodland, Kans.

Goodland telephone users are progressive. When it became evident that magneto telephone service was obsolete for that rapidly-developing community, they met with officials of the United Telephone Co. and requested that a modern and complete installation be made.

The telephone company made many plans before again meeting with Goodland patrons. The company submitted a complete proposal for the new plant and a schedule of rates adequate to justify it. This proposal was accepted by Goodland and approved by the state regulatory body.

The modern and complete telephone system has been installed and is now in everyday service.

A site for the new exchange building was purchased. It is a corner on the main business street close to the "wire center" for the town. This wire center is the point determined by engineers as that which will permit the most economical network of wires reaching from the central office to every telephone. The location is a prominent business corner and a building was designed that has become a distinct addition to the business district.

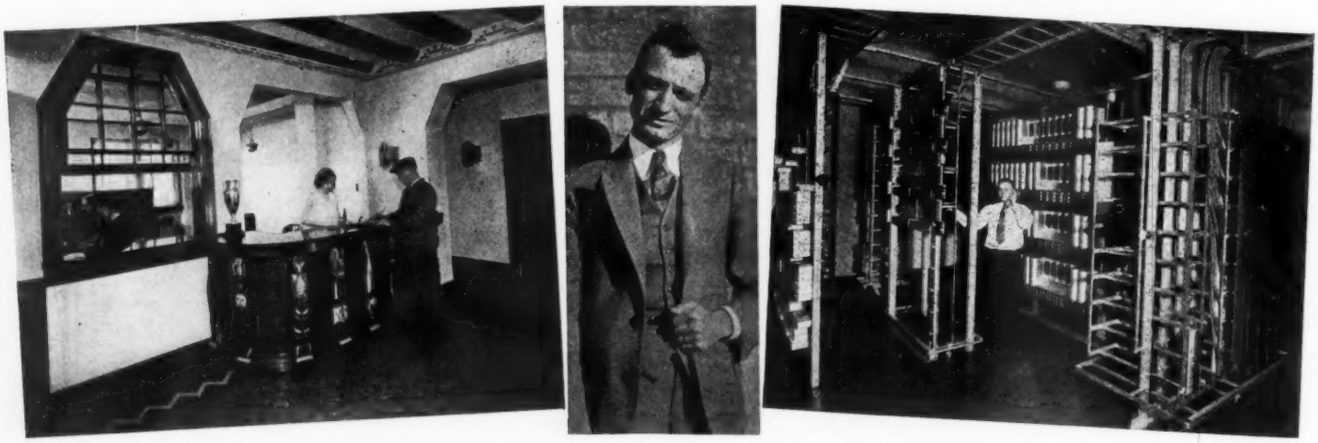
Goodland is a city of the western Kansas plains and an Indian motif was happily selected for the decoration of this new structure. Indian art is distinctively American and a colorful combination of symbols has been worked into the design.

The terra cotta panels and borders of the exterior of the telephone building have all been taken from the Aztec tribal artwork. These decorations fit with the modern syle of architecture to a surprising degree. Lines and planes of the symbols reflect accurately the proportionate contours of the masonry. The structure is actually a two-story brick and masonry fireproof building, but the bright colors and light background give it a gay air.

The business office carefully follows the decorative impression created by the exterior of the building. The ceiling is heavily beamed with rough poles stenciled with Indian patterns. Telephone linemen may get "climbers' itch" from gazing at this ceiling. Each of the beams is an actual telephone pole trimmed and decorated.

The business counter is supported on hand-carved totem poles. These also are a strictly Indian form of art, and each column is a replica of an actual Indian totem. The originals are all to be found in the Smithsonian Museum in Washington, D. C. Each pole tells a story and those adept in this form of Indian art can readily read the carvings. The same type of carving has been used on the bench in the lobby beside the telephone booths.

It hardly seems fair to term the private long distance rooms in this building "telephone booths." For many years manufacturers and designers used all of their in-



View of Attractive Customers' Lobby of the Goodland, Kans., Ex change Showing the Long Distance Switchboard Through the Window; Note the Carved Totem Poles and the Telephone Pole Beams in the Ceiling—Colby Hamilton, Superintendent of Equipment, United Telephone Co., Goodland—View of Automatic Switching Equipment Installed at the Goodland Exchange.

A COMPLETE TELEPHONE EQUIPMENT SERVICE FOR CANADA...

Everything a telephone company could use—telephones, both automatic and manual, automatic and manual switchboard equipment, construction materials, wires, batteries, supplies—are kept in stock by us. We are prepared to fill every requirement—promptly—with well-known products, noted for their unvarying standards of high quality.

Besides this, we have our own manufacturing and repair facilities—each department manned by experts highly skilled and experienced in their particular specialty. No matter whether you anticipate the modernization of a small rural exchange or the installation of a complete metropolitan telephone system, we are prepared to handle the undertaking in its entirety. Secure prices and proposals from us before making your next purchase—they will be gladly furnished upon request.

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VANCOUVER, B. C.

Representatives in Canada for

AMERICAN ELECTRIC COMPANY, Chicago
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THE NEW ANTWERP TELEPHONE AND ELECTRICAL WORKS, Antwerp
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UNPROTECTED POLE CABLE TERMINAL

Cook XB Terminal gives you many new practical features not found in any unprotected terminal. The pressed metal core box of Toncan Iron insures long life — The Bakelite face plate and fanning strips provides perfect insulation — The perfect method of attaching and protecting the cable sheath prevents interruptions.

Cook XB Terminal, designed to last as long as your cable, is trouble-free and will lower your maintenance and operating cost.

COOK ELECTRIC COMPANY
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LEICH

No. 47-A and No. 48-A

RINGING CONVERTERS

No Radio Interference

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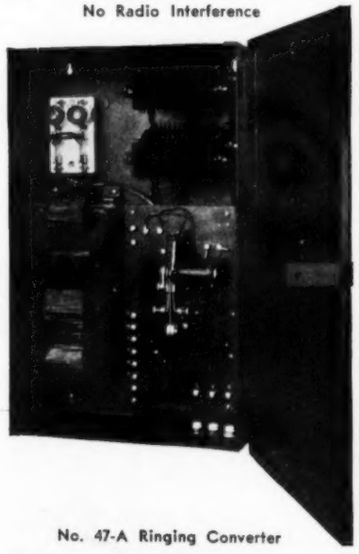


EFFICIENT

No. 47-A Ringing Converter

Will pay for itself in saving of power current in eighteen months.

LEICH ELECTRIC CO.
GENOA, ILL.

"The first to produce a successful ringing converter to operate from alternating current."

genuity to create as compact a place for private telephone conversation as possible. This zeal permitted the placing of a booth in very limited space but the user must be both spry and slender to use them.

In the Goodland building two acoustically-perfect rooms have been built. These are eight feet by six feet with a table and chairs for the comfort of the patron. The same Indian motif is carried out in the decoration, lighting fixtures and furniture. Patrons of long distance service may place their calls from these rooms with all of the convenience of a complete private office.

The office of W. L. Ginn, local United manager, is conveniently adjacent to the customers' lobby. The door to his office is stenciled with the Navajo design for eagle feathers, which were used to designate the "chief." His furniture and the color scheme of the office follow the same plan as for the public room.

The room containing the long distance, rural and information switchboard also opens on the Indian lobby. It is light and airy to provide ideal working conditions for the operators. This room—in fact, the whole building—is kept at the correct temperature and humidity through the latest in air conditioning equipment. As far as can be determined this is the first telephone building anywhere to be air conditioned both summer and winter.

Before describing the telephone equipment at Goodland, credit for the attractiveness of the exchange building will be given. Joe Fargo, United construction superintendent, was in complete charge of its erection and he put the building up in record time. Charles W. Shaver, architect, of Salina, Kans., drew the plans and Joe Murray, United architect, supervised each step during the construction.

Colby Hamilton, superintendent of equipment, was the untiring "man on the job" for both the building and equipment. He is largely responsible for the fact that this exchange installation is just as attractive as it is efficient. His research through Indian symbols and mythology brought out the many designs that appear throughout the structure as well as the stories told by the totem poles in the lobby.

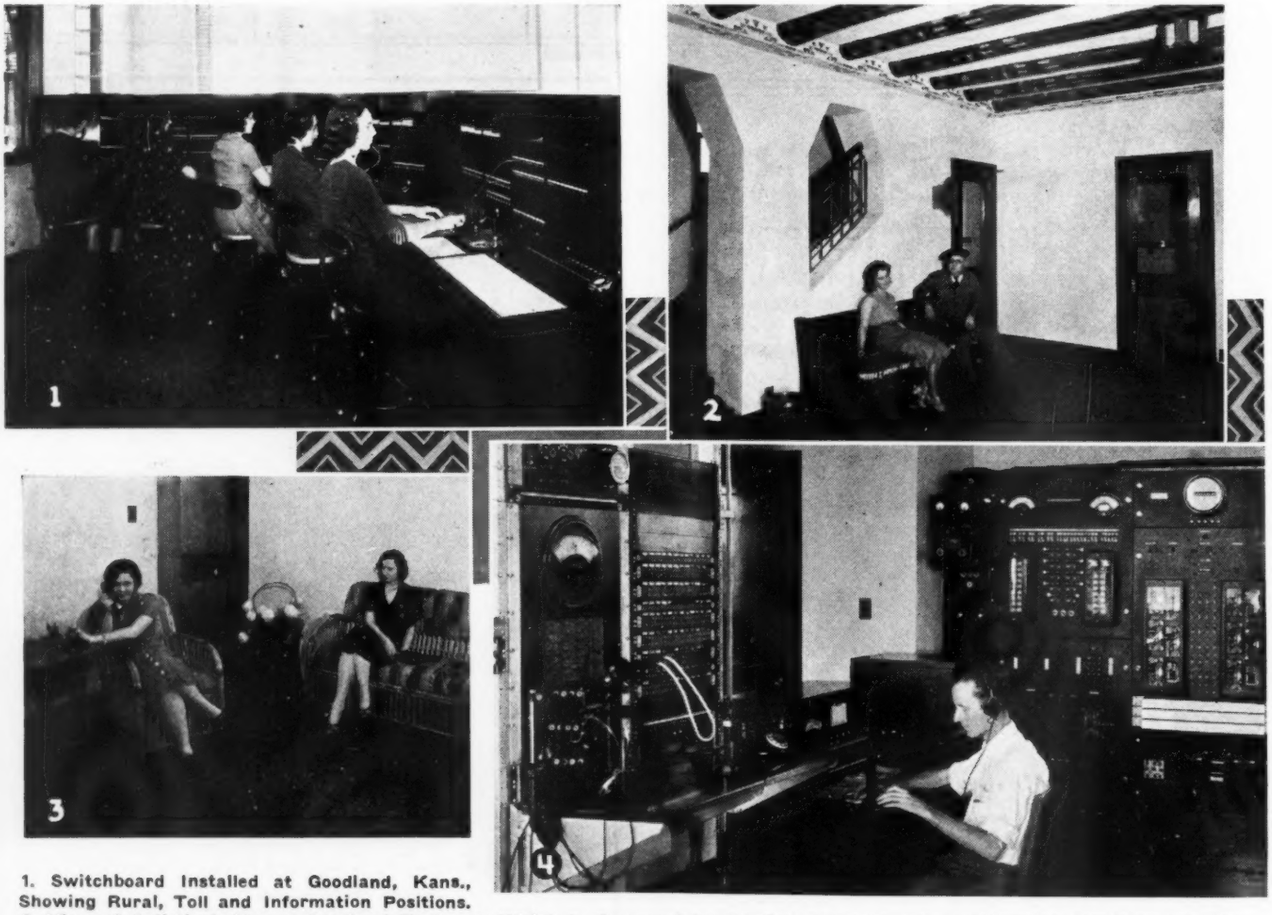
The manual switchboard on the main floor cares for all long distance calls, rural connections and information. There are two positions for rural, information and intercepting, three for long distance and a fourth has been wired for this purpose when needed. This switchboard is unusual in that all supervisory equipment, with the exception of the various cord lamps, is a part of the line and trunk circuits.

The cord circuits are very simple and all of one type. Any cord, either answering or calling, may be used for dialing and may be used with any line or trunk. Lamps are used to designate the busy lines and trunks instead of the usual mechanical signals. A new high resistance switchboard lamp has made this practical. All long distance calls may be handled by the CLR methods. The party placing the call remains on the line while the operator builds up the circuit and completes the connection.

The second floor of the new Goodland building houses the attractively-furnished lounge room for the operators and the dial telephone equipment that serves the city patrons. An attractively grilled iron stairway leads upward to this section.

The operators' lounge is furnished with chairs, settee, reading tables and other comforts. It is a pleasant place to relax from the strict attention required at the switchboard. This clubroom contains periodicals and pictures of special interest to the girls.

All of the equipment for furnishing automatic telephone service to Goodland patrons is housed on the second floor. Strowger No. 30 type apparatus is used. All switches mount on double-sided, nine feet high racks. The primary line switch and connector racks are located adjacent to the main distributing frame, and in such a



1. Switchboard Installed at Goodland, Kans., Showing Rural, Toll and Information Positions.
2. View of Artistic Lobby of Goodland Exchange Which Is Arranged for Comfort of Customers. 3. Attractive Restroom for Operators Contributes to Efficient Telephone Service. 4. View of Test Board Installed in the Goodland, Kans., Exchange.

AYER & LORD TIE CO

CHICAGO, ILLINOIS

TELEPHONE POLES

RAILROAD CROSS TIES — LUMBER — TIMBER PRODUCTS — FENCE POSTS — PILING

Wood Treatments and Preservation

Plants—Carbondale, Ill., Grenada, Miss., Louisville, Ky., North Little Rock, Ark., Montgomery, Ala.

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Volume 17	January - June, 1909
Volume 18	July - December, 1909
Volume 19	January - June, 1910
Volume 65	July - December, 1913
Volume 75	July - December, 1918
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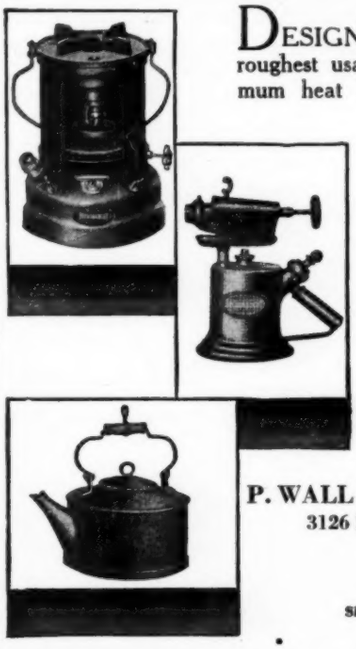

DESIGNED to withstand roughest usage, delivering maximum heat for long periods of time and operating in windiest weather. Also brazed steel double-jacketed compound kettles. Write for information about the DREADNAUGHT line.

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SINCE WALL SUPERIOR PRODUCTS 1864

"Cope" TOOLS for UNDERGROUNDCABLE INSTALLATION

Quick Coupling Rods
Screw Coupling Rods
Cable Benders
Cable Racks
Cleaning Tools
Pull in Guides
Manhole Guards
Reel Jacks

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way that jumpers are run direct to terminal strips on these racks.

This arrangement does away with all cabling from primary line switches and connectors to the main distributing frame and gives all the advantages of a Line Intermediate distributing frame. Any connector number may be cross-connected to any line switch, and any line switch to any subscriber's line. A redistribution of originating traffic may be made at any time without number changes and the loads on the primary line switchboards kept evenly balanced.

The newest self-aligning plunger-type line switches are used. These switches, together with their associated master switches, are mounted on horizontal shelves which are hinged to facilitate maintenance.

There are 900 primary line switches and the same number of connector terminals divided among 600 individual, 200 party and 100 P. B. X. lines. All connectors have 200 line banks except the P. B. X. switches, which have the usual 100-line banks. This arrangement permits larger and more efficient trunk groups. It also allows leeway for considerable growth without the addition of second selectors.

The party-line switches furnish four-party full selective service. Ringing current is of the harmonic non-multiple type. All subscriber numbers are of four digits with the exception of the P. B. X. assignments which are three-digit. This permits a maximum of 9,999 Goodland telephones and 999 P. B. X. trunks without causing a change of numbers in the telephone directory.

The battery room is on the second floor of the building. The power board, on which is mounted the Tungar battery chargers, ringing machines and control apparatus, is located just outside the battery room in view of the testboard and most of the switchroom. All power cables are carried on racks which permit easy maintenance and low cost additions for future growth.

The storage battery has 26 chloride accumulator type cells sealed in glass jars. The battery is kept on a constant "float" with "end" cells held in reserve for interruptions in the commercial power supply.

A turret type testboard mounted on a flat-top desk contains all equipment for testing the exchange equipment and subscriber lines. A voltmeter, dial speed indicator and trunks are all a part of this apparatus. Toll terminal equipment and a toll testboard are mounted on standard relay racks. Particular stress in engineering was placed on obtaining an ideal arrangement in the present plant and at the same time giving due allowance for future additions at minimum cost.

V. L. Bunkleman of Automatic Electric Co., Chicago, was the only man outside the United organization on the job. R. F. Herman of the equipment department and his crews neatly and completely installed all of the intricate apparatus. Their work was so accurately done that the cutover did not disclose a single serious case of trouble.

The Cottage Type Telephone Building Which Served the Goodland, Kans., Exchange for a Number of Years—Old Magneto Switchboard Which Was Used at Goodland for Years.

While this "most modern, most complete" building has been decorated attractively, it is a telephone building, and that fact was always considered in preparing the plans. It is a fireproof building from top to bottom. The floor plan provides light and ample room for every phase of the telephone business.

It was quite an accomplishment to achieve such pleasant decorative results while providing scientifically accurate space for telephone equipment and employes. This office shows what can be done when imagination and taste are coupled with engineering skill. The visible originality in the Indian motif of the building decoration is equalled, if not surpassed, by the engineering ingenuity shown in equipment design and installation. Forward-thinking telephone men can profitably study every phase of this work.

The whole is a beautiful job, well done and there can be no doubt that the United Telephone Co. fulfilled every promise in completing the installation of this exchange.

In order to give the people of Goodland a chance to inspect the new building and equipment, the company held Open House on November 21. In spite of a heavy snowstorm and cold weather, more than 800 visitors registered during the day. Souvenirs and prizes including credit tickets on long distance calls and free service for lucky numbers were given out.

In the evening an informal dinner was given by the Chamber of Commerce for officers of the United Telephone Co. This was followed by the formal dedication of the new exchange. On both occasions citizens expressed in a very fine way appreciation for the excellent telephone service the city is now receiving and for the mutual confidence that exists between the company and the people.

In the dedication ceremony a bronze tablet was placed in the wall. In a sealed lead box were deposited photographic and documentary records of the occasion, copies of newspapers, the company magazine, lists of company and city officers and numerous other items which will be very interesting to a future generation.

Historical Museum of Bell Company of Canada in Montreal.

The historical museum of The Bell Telephone Co. of Canada, presenting the most complete accumulation of old-time telephone apparatus and historical pictures and documents in Canada, and perhaps within the British Empire, was officially opened by Vice-President J. E. Macpherson on Friday, December 11, in Montreal, Quebec.

Situated on the 20th floor of the company's Beaver Hall building headquarters in the Canadian metropolis, the museum contains more than 400 exhibits, ranging from a model of Alexander Graham Bell's first instrument to the modern handset telephone on the desk of the curator, F. A. Field, who is himself a well-known telephone pioneer in the Charles Fleetford Sise chapter.

Visitors to the museum are introduced to many specimens of the great number of changes that have taken place in the telephone field within the past 55 years. These include samples of laboratory research in the realm of electrical communication as, for example, the various steps in the developments of magnetos, batteries, transmitters, receivers, cables, switchboards, repeaters and associated apparatus. The exhibits of smaller pieces of equipment are, for the most part, displayed in sealed glass cases.

Some of the oldest pieces in the museum are different types of wooden telephone receivers used in 1876. There is on display a subscriber's telephone set and key switch that was used in Hamilton, Ontario, in connection with the first telephone exchange in the British Empire—and second only to New Haven, Conn., in the world—opened in March, 1878. Several early Edison telephones of the same year, used in Montreal, are also exhibited.

From 1877, a year earlier, the museum has preserved a telephone set purchased from and installed by Alexander Graham Bell at Dundas, Ontario. Another old-time display is that of the first Blake transmitter used in Canada in 1877.

Perhaps the most amusing of the

museum's contents are the framed copies of the first advertisements of telephone service in Canada. These are in color and were circulated some time during the year 1877.

Other frames, artistically arranged around the side-walls of the room, contain photographs of Dr. Bell; his father, Professor Melville Bell, and many of the other early telephone workers who assisted in the introduction of telephony to a then skeptical public. There are also photographs of the founders of the Bell Telephone Co. of Canada and succeeding members of the boards of directors.

Many old-time documents and letters make interesting reading. They are displayed under glass and reveal the vicissitudes of many of the earliest telephone pioneers who worked under all manner of trials and rejections to establish lip-to-ear communication in various parts of the Dominion in the '70's and '80's.

While only a few originals have been taken from their vaults, photostatic copies of practically all of the earliest telephone documents have been placed in the telephone museum. There is, for example, the first telephone lease executed in Canada, dated November 9, 1877. A group of representative telephone directories of half-a-century ago recalls many outstanding Canadians of another day among the subscribers listed.

Concerning the inception and purpose of the museum, at the official opening Vice-President J. E. Macpherson said, in part:

"We have felt for many years past that the record of telephone progress was of such peculiar interest, both in the evolution of the apparatus which has served to steadily enlarge the bounds of oral communication and the development of the organizations and the personnel that have provided telephone service in Canada, that the story should be preserved in physical form so that Canadians might have access to it at any time, and might come to appreciate the romance of its achievements.

In the exhibits here collected may be traced the physical development of the telephone in Canada as well as much of the story surrounding the activities of telephone pioneers. We believe this effort toward the preservation of this record is worth-while."

Pennsylvania Bell's $25,500,000 1932 Construction Program.

A $25,500,000 construction program for 1932 was announced on December 25 by the Bell Telephone Co. of Pennsylvania through its president, Leonard H. Kinard. This will bring the total outlay for improvements for the three-year period ending next year to $95,000,000.

The company will devote $8,500,000 to new construction in Philadelphia. Operating expenses of the company throughout Pennsylvania next year, exclusive of improvements, will total $42,000,000.

You'll Make

More Line Joints per Hour or Day with

NATIONAL

National Double Tube, sleeve sizes, 17 B & S to 4/0 B & S Strand.

SPLICING SLEEVES

than any other way

The first step is to run wires or cables through sleeves. Let the ends protrude.
Completed National Splice
Then bend the ends with pliers is the second step in the splice that holds.
Next—make 3—½ turns with pliers on either end—twist tightly.
NATIONAL
Cut off ends and you have a good strong, neat splice.

"If It's a Splice— Make It a National"

Many practical tests have proven that with "Nationals" your linemen will make more joints within a given time than by any other method of splicing. And besides being quick and easy to install, they have great tensile strength and durability and each joint is uniform with every other and as tight as if welded. Write for samples and prices.

THE NATIONAL TELEPHONE SUPPLY COMPANY

5100 Superior Ave. **Cleveland, Ohio**

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Interstate Commission Approves Transfer of Properties.

Approval of the acquisition of the Central Bridge Telephone, Inc., properties at Central Bridge, N. Y., by the New York Telephone Co. was granted by the Interstate Commerce Commission on December 9 The Central Bridge company owns and operates a central office in the village of Central Bridge. It serves 186 subscriber stations in parts of Schoharie and Montgomery counties, N. Y., and has six pole miles of toll lines.

The plant is connected with the New York company's system. No competition exists in the territory of the Central Bridge company.

The territory served by the Central Bridge company is rural in character and contains no settlement larger than the unincorporated village of Central Bridge, which has a population of about 400. This territory adjoins the New York company's Esperance central office district and is tributary to its Amsterdam and Schenectady districts, which are a obut 18 miles distant.

Because of the comparatively restricted area the properties of the Central Bridge company have had a lmited development. Its lines are ground return circuits. It is claimed that a considerable sum should be expended for necessary reconstruction of outside plant and other improvements required to care properly for existing development and to provide for future growth.

The smaller company is said to be unwilling to make the expenditure required for these purposes. The New York company, upon acquiring the properties, will proceed to install such additional facilities as may be necessary to render a proper grade of service. It estimates that such improvements will require an expenditure of at least $14,000.

Property Transfers Approved by Minnesota Commission.

On December 22, the Minnesota Railroad & Warehouse Commission approved the purchase of the Oakwood Telephone Lines, Wabasha county, by the Wabasha County Telephone Co., Plainview. The stockholders of the Oakwood Telephone Lines had approved the sale of their properties according to law.

The commission found that the transfer will not, in any way, conflict with the public interest and will extend and improve the service in this territory.

On the same date the commission approved the sale of six miles of line, owned by the Bear River Valley Rural Telephone Co., Itasca county, to the Carpenter Township Telephone System. This line runs between the villages of Bear River and Togo.

The sale and transfer were requested on the part of the Bear River company because it was not serving any subscribers on this particular six miles of line; and it was requested on the part of the Carpenter system because its one line running between Bear Creek and Togo is so heavily overloaded.

Ohio Commission to Consider State's Request for Bell Data.

The Ohio Public Utilities Commission has set a hearing in the state-wide investigation of rates of the Ohio Bell Telephone Co. for January 20. The commission on that date will take up the 26 specific requests of Attorney General Gilbert Bettman to require the Ohio Bell Telephone Co. to furnish data on which its exhibits of Western Electric Co. production costs and profits on materials furnished the Ohio Bell company are based. Figures for the years 1925 to 1931 are particularly desired.

Recently the Ohio Bell company offered to open records of the Western Electric Co. in New York for inspection by examiners representing the Ohio commission. The attorney general in a memorandum filed with the commission on December 29 characterized the offer as "inadequate" and again asked the commission to require the company to furnish the desired information.

The response made by the Ohio Bell company, Mr. Bettman charges, "fails to furnish any of the information requested and amounts merely to an offer to throw open the books of the Western Electric Co. at its offices in New York and let us search the haystack for the needle.

"We respectfully submit that this commission should use the same judicial exactitude in protecting the public from exorbitant rates that the company would have it use in protecting the company's property from confiscation. The public interest demands that the underlying data used in compiling exhibits be scrutinized by impartial, qualified auditors.

"Inasmuch as the company has declined to furnish any of the specific information asked for but merely agreed to throw open the books to let us find it if we can, it is respectfully submitted, therefore, that this matter be set down for hearings at an early date in order that a ruling may be had as to each of the specific requests and comments above.

Folowing this the attorney general will determine his course as to sending representatives to the New York office of the A. T. & T. Co. and of the Western Electric Co. for the purpose of completing an examination of their books as indicated herein."

Tennessee Municipalities May Levy Telephone Pole Tax.

Municipalities in Tennessee may levy a tax on each telephone or telegraph pole within their corporate limits, the revenue to go entirely for municipal purposes, under the new general revenue bill passed by the extra session of the legislature, which became effective December 24.

The tax is for rental of the streets or thoroughfares and is limited to 25 cents a pole.

This is the first revenue bill passed since 1927.

Issuance of Stock Authorized in Wisconsin Property Transfer.

Under date of December 29, 1931, the Wisconsin Public Service Commission authorized the Commonwealth Telephone Co., a subsidiary of Associated Telephone Utilities Co., to issue $45,200 of common stock for the purpose of securing funds with which to acquire the properties and assets of the following telephone utilities, subject to existing liabilities and/or credit accounts as of October 31, 1931:

Lac du Flambeau Telephone Co., Marquette Telephone Co., Nichols Telephone Co., Sayner Telephone Co., Three Lakes Telephone Co., Adams County Metallic Telephone Co., Bingham Telephone Co., Delton Telephone Co., Farmers Inter County Mutual Telephone Co., Freeman Telephone Co., Friendship Telephone Co., Holton Telephone Co., and the Wise Telephone Co. of Birchwood.

Authority was also granted to acquire the following properties, free and clear of all encumbrances, as of October 1, 1931:

Washington Telephone Association, located in the village of Hill Point, Sauk county; Bear Valley Telephone Co., located in Sauk county, near the village of Lone Rock; West Spring Green Telephone Co., located at Spring Green; Yellowstone Telephone Co., located at Argyle.

The Commonwealth Telephone Co. had grouped the utilities to be acquired into three purchasing blocks and asked the com-

(*Please turn to page* 42.)

Voltage measurements made on circuits, or potential sources of relatively high resistance, require that the voltmeter have a high resistance, so that it draws very little current for its operation. Examples of high resistance voltage sources or circuits are radio "B" eliminators or power supply units, and most telephone circuits. The error that would result from the use of a low resistance voltmeter on a high resistance circuit is illustrated in Fig. 1.

The resistance of a voltmeter is usually referred to in terms of the number of "ohms per volt"; that is, a 10-volt meter with a resistance of 100 ohms per volt would have a

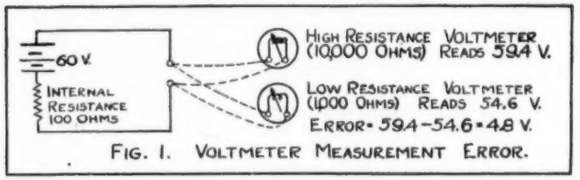
60 V.
INTERNAL RESISTANCE 100 OHMS
HIGH RESISTANCE VOLTMETER (10,000 OHMS) READS 59.4 V.
LOW RESISTANCE VOLTMETER (1000 OHMS) READS 54.6 V.
ERROR = 59.4 − 54.6 = 4.8 V.

FIG. 1. VOLTMETER MEASUREMENT ERROR.

total resistance of 1,000 ohms. The direct current voltmeters commonly used in connection with measurements on low resistance circuits, have resistances of approximately 100 ohms per volt, and would be classified as low resistance meters.

Voltmeters suitable for measurements on high-resistance circuits, such as are encountered in connection with radio and telephone work, are designed to have a resistance of 1,000 ohms per volt, or greater. The current required for full scale operation of such a meter is only one milliampere; hence it introduces only a small drop in voltage in the internal resistance of the circuit being measured.

Results of Improper Use of Ammeters or Voltmeters.

In using electrical measuring instruments one of the first things to learn is to *never connect an ammeter across the circuit or source being measured.* Failure to observe this precaution may result in an expensive instrument being burned out. As previously explained, ammeters are very low-resistance instruments and must always be connected in series with the circuit or current under measurement.

An example of the results would be the connecting of a one-ampere ammeter, the resistance of the winding of which would be perhaps 0.075 ohm, across the terminals of a six-volt storage battery. The current which would flow would be $I = E/R$ or $I = 6/.075 = 80$ amperes. Such a current flow would burn out the meter almost instantaneously.

Before inserting an ammeter in a circuit care should be taken to see that the equipment under measurement cannot become short-circuited as this would impose a severe overload on the ammeter and would be equivalent to connecting it directly across the circuit.

Voltmeters are less subject to damage than ammeters; and

if accidentally placed in series with a circuit, no damage to the instrument will result. However, the high resistance of the instrument will usually prevent the normal operation of the circuit.

Direct Current Ammeter Design.

The D'Arsonval movement as used in direct current ammeters and voltmeters is very sensitive and requires only a few milliamperes, or even less, of current to give full-scale deflections. In order that a standard type of moving coil may be used in ammeters of both low and high range, recourse is made to the use of shunts which are so designed that a portion of the current passing through the meter is by-passed through the shunt which is connected directly across the moving coil.

The ratio of the resistance of the shunt to that of the moving coil is so worked out that a definite proportion of the current being measured passes through the moving coil, and the ammeter scale is calibrated to show the total current flowing through the coil and shunt and not merely the current flowing through the moving coil. Fig. 2 illustrates the principle of the ammeter shunt as applied to a 100-milliampere meter.

The larger the amount of current to be measured, the lower resistance and greater current-carrying capacity a shunt must have. Shunts such as are used to carry 15 amperes or greater are usually of a type having heavy terminals and are designed to mount external to the meter.

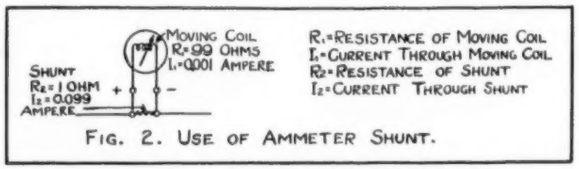

FIG. 2. USE OF AMMETER SHUNT.

In designing shunts for ammeters it is the practice of the larger instrument manufacturers to design the shunt so that the drop in voltage across its terminals will be 50 millivolts when carrying the desired maximum current and using such shunts with a moving coil millivoltmeter giving full scale deflections on 50 millivolts.

This practice facilitates the associating of a standard type of moving coil instrument with a number of shunts to cover different ranges. Fig. 3 shows the type of shunt commonly used. For example, a shunt designed to give a range of 100 amperes would have a resistance of .0005 of an ohm. Therefore, 100 amperes flowing through the shunt would result in a drop of potential of 0.05 volt which would produce a full-scale deflection when used with a 50-millivolt meter.

Individuals designing shunts for use with available ammeters or milliammeters do not follow this practice, but

consider only the resistance of the moving coil movement and the associated shunt, arranging the resistances of the shunt so that the current will divide in the proper proportions to produce full scale deflection, at the desired maximum current.

In connection with switchboard instruments employing shunts mounted external to the meter and using paired wire between the meter and the shunt, it is important that the

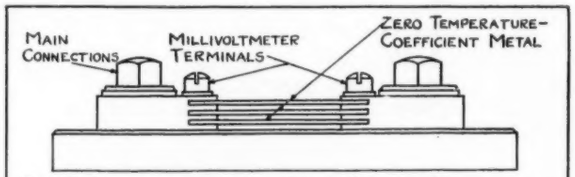

FIG. 3. TYPE OF EXTERNAL SHUNT USED ON AMMETERS MEASURING CURRENTS ABOVE 15 AMPERES.

same lead wires employed in the calibration of the instrument be used. Even a small resistance variation would appreciably affect the calibration of the meter, inasmuch as the meter requires only 50 millivolts for full-scale deflection.

This accounts for the reason that on the back of telephone power panels the instrument leads to the shunt may be longer than necessary and are coiled up. Uninformed people, observing the unsightly appearance of the coiled leads, have frequently attempted to shorten them, with the result that the instrument reading was thrown in error.

The resistance of moving coils used in ammeters is ordinarily lower than that of the moving coils used in voltmeters. The reason is, as previously pointed out, that it is desirable to keep the resistance of an ammeter as low as possible so that it may be inserted in a circuit without affecting the conditions in that circuit. It is, therefore, necessary that the resistance of the moving coil be sufficiently low that current will divide between it and the shunt in the proper proportions. The resistance of the millivoltmeter coils used in high grade ammeters is usually between one and two ohms whereas the resistance of the moving coils in a good many voltmeters is as much as 70 ohms.

Design of Ammeters and Milliammeter Shunts.

The design of shunts for ammeters and particularly milliammeters is a relatively simple process and anyone working with electrical instruments should have a good understanding of the procedure. In practical work, cases often arise where meters are available but of the wrong range and it is desired to change the range to one that fits the particular need. This may be easily accomplished by using the procedure described in following issues, involving four steps, or by simple cut and try methods with two meters in series.

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MANUFACTURERS' LITERATURE

The following is a brief description of recently published bulletins, catalogs, etc. If you are interested in obtaining copies address your request to the manufacturer.

Notices Previously Published

CLIMBERS
16-page booklet illustrating and describing climbers, straps, pads, tool belts and safety straps for linemen. **W. H. Buckingham, 503 State Street, Binghamton, N. Y.**

MAGNETO EQUIPMENT
New 72-page general catalog prepared expressly for magneto exchanges. It completely covers all necessary equipment, apparatus, and supplies for magneto plants. **Kellogg Switchboard & Supply Company, 1066 West Adams Street, Chicago, Ill.**

POLES
A 16-page illustrated booklet entitled, "Termites—A Growing Menace to Untreated Timber." **Ayer & Lord Tie Company, Railway Exchange Bldg., Chicago, Ill.**

POLES
"Handbook of Practical Information About Cedar Poles and Butt-treating," is the title of a 40-page, illustrated book now available. **Page & Hill Company, Minneapolis, Minn.**

POLE SPECIFICATIONS
A 16-page pamphlet containing complete specifications for Southern Yellow Pine poles as prepared and approved by American Standards Association. Supplemented by one 4-page folder containing information relative to the basis on which the new specifications were prepared, and another 6-page bulletin giving a graphic comparison of the existing specifications against the specification proposed by the American Standards Association.

RINGING CONVERTERS
Bulletin No. 150 entitled "Leich Ringing Converters" describes and illustrates converter equipment for producing ringing current; this includes harmonic converters, ringing frequency converters and ringing converters with charger equipment. **Leich Electric Co., Genoa, Ill.**

SALES CAMPAIGNS
Two Small Folders specially designed for extension sales campaigns are now available. They will be furnished complimentary all ready for insertion with your monthly bills—they can be obtained in any quantity required. **American Electric Company, Incorporated, State & 64th Streets, Chicago, Illinois.**

TRANSMITTER BATTERY POWER UNIT
New bulletin TC-39 describing the new type CAB-4 combination storage battery and trickle charger power unit for magneto operator's transmitter battery, and its use. **Fansteel Products Company, Inc., North Chicago, Illinois.**

TREE TRIMMING EQUIPMENT
Bulletin Number 18—12 pages—describing and illustrating various tree trimming tools specially constructed for line work. **Bartlett Manufacturing Co., 3003 East Grand Blvd., Detroit, Mich.**

WOOD PRESERVATIVE
An eight-page booklet entitled, "ZMA for Wood Preserving," regarding the different uses of ZMA wood preservative. **Curtin-Howe Corporation, 405 Lexington Ave., New York City, N. Y.**

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Condensed Telephone News

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items Relating to Construction, Rebuilding, or Changes in Their Plants and Systems

Elections.

WILKINSON, IND.—The annual meeting of the Wilkinson Switchboard & Telephone Co. was held recently and officers for the coming year were elected as follows:

President, Cecil Morris, vice-president, Ed Scott and Bert Burns; secretary-treasurer. The present board of directors will remain in office.

BLOOMFIELD, IOWA.—H. L. Clark has been elected president of the Floris Mutual Telephone Co. and other officers have been chosen as follows: C. G. Koebke, vice-president and Vessie Hinkle, secretary-treasurer.

WINTHROP, IOWA.—At the annual election of the Winthrop Telephone Co. the following officers were elected: Henry C. Unbehaun, Henry Ball, David M. Love, Thomas Powell and Fred Schweitzer. Mrs. Lorma James has been retained as manager.

HARTFORD, KY.—The officers of the Farmers Mutual Telephone Co. have been reelected as follows: Lon Smith, president; Alva Carter, secretary-treasurer; and C. H. Duke, manager.

MANTI, UTAH.—Stockholders of the Manti Telephone Co. at their annual meeting elected the following officers: President, Dr. G. Sears; vice-president, Alexander Barton; secretary and treasurer, Pratt Allred; directors, Andrew Miller and A. O. Anderson.

WAITSBURG, WASH.—The Waitsburg Rural Telephone Co. recently elected: President, W. F. Hawks; vice-president, Henry Vollmer; secretary-treasurer, H. D. Mills, and director, Chester J. Woods. Other directors are R. M. Pollard and E. D. McCoy. The directors levied an assessment of $12 a share on the stock of the company for 1932.

Construction.

WILMINGTON, DEL.—The Diamond State Telephone Co. will spend $800,000 for new construction and betterments throughout Delaware this year.

CHICAGO, ILL.—At its December meeting the board of directors of Illinois Bell Telephone Co. approved expenditures of $5,751,738 for additions and betterments to the telephone plant in the city of Chicago, and $1,198,197 for the territory outside of Chicago, making a total of $6,949,935. This brought the total amount approved for such additions and betterments last year to $25,573,494.

NEW YORK, N. Y.—The expenditure of $10,513,265 for new construction throughout the state was authorized by the board of directors of the New York Telephone Co. at the regular monthly meeting held December 23. This brought the total appropriations during 1931 to $69,116,545, of which $53,250,145 was provided for the extension of facilities in the metropolitan area.

The expenditures for Manhattan provide $3,862,700 for the enlargement of telephone facilities in all parts of the borough.

WELLSTON, OHIO.—The local telephone office of the Ohio Standard Telephone Co. is to be moved in the near future to the McClung building on north Ohio avenue from its present location on Broadway, according to Ralph Hamilton, general manager. A new switchboard and other equipment will be installed at once in the new exchange building. The equipment at Wellston is to be brought up to the highest standard, it is announced.

OKLAHOMA CITY, OKLA.—The Southwestern Bell Telephone Co. has opened its new telephone exchange service in Hartshorne and Haileyville. A new brick building, switchboard and other equipment was recently completed by the company in Hartshorne to handle the service for both towns.

SKIATOOK, OKLA.—The Standard Telephone & Telegraph Co. has announced that it will build a toll line which will give Beaver direct toll connection with Perryton, Texas.

Miscellaneous.

CLINTON, ILL.—H. T. Williamson, general manager of the Illinois Central Telephone Co., announces appointment of Robert Quimby as manager at Clinton, succeeding Frank Witts who will assume other duties with the company.

ARMSTRONG, IOWA.—T. L. Arvig has sold the telephone exchange here to T. F. Johnson, Swea City, owner of the Swea City exchange who took charge on January 1. Mr. Arvig had operated the exchange the past five years having purchased it from J. S. Beers.

HARTFORD, KY.—The board of directors of the Hartford division, Farmers Mutual Telephone Co., has lowered the rates for the ensuing year on all classes of lines. Business telephones, formerly $2.50 per month, are now only $1.75; individual residence telephones, formerly $1.50 per month, are now $1.00; rural party lines, formerly $1.50 per quarter, are now $1.00.

ALBEMARLE, N. C.—Started 34 years ago by J. W. Cannon, J. S. Efird, J. M. Morrow and R. A. Crowell and with capital of but $400, the Albemarle Telephone Co. was to be sold to Southeast Public Service Co., of Charlotte, on January 2.

T. M. Denning, general superintendent of the Wisccassett Mills Co., is president of the Albemarle Telephone Co., which operates about 1,000 telephones with exchanges at Oakboro, New London and Badin. W. H. Morrow is secretary and treasurer and H. L. Horton is vice-president and general manager.

The South East Public Service Co., incorporated in West Virginia, operates electric light and power and telephone properties in North Carolina, Virginia and West Virginia.

Stockholders of the Albemarle Telephone Co. will receive $100,000 in cash and a considerable amount of stock in the purchasing concern, it is reported in Albemarle.

The new company is already formulating plans for expansion of its properties in this vicinity.

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WHAT THE COURTS AND COMMISSIONS ARE DOING.

(*Continued from page* 38.)

mission for authority to issue a total of $159,100 of common stock to purchase them. The commission, however, found that the net value of the assets to be acquired was only $45,200 and authorized common stock equal to this amount, in lieu of the amount applied for.

The commission's order permits the acquisition of the telephone utilities and placing them on the books of the Commonwealth company only at figures not in excess of the amounts stipulated by the commission.

Nebraska Commission to Study Depreciation and Maintenance.

The Nebraska State Railway Commission has asked the six leading telephone companies doing business in the state to supply it with complete information, by June of this year, dealing with the experience of each of them over a sufficiently long period of years as to make the studies worth while, with respect to maintenance and depreciation costs.

Commissioner Drake, who has the matter especially in charge, had occasion recently to examine studies made by the state college of agriculture of Iowa with respect to the duration of the life of farm machinery and equipment and also of telephone companies. He was surprised to find that with respect to the latter, depreciation was at a rate much higher than had been the estimate made in Nebraska and used in determining what are proper charges to be made for depreciation and maintenance.

Mr. Drake says that it is important that these charges reflect the facts, and he thinks the best way to ascertain them is from the experience of the companies. The Lincoln Telephone & Telegraph Co. plans to go back to 1912, when it first took over a large number of companies in the southern section of the state, and will trace expenses from then to the end of 1931.

The result, the commissioners think, should be of much value to the smaller companies, a number of which do not take proper care of their properties in a maintenance way and which are not setting up sufficient depreciation to insure continued operation on an efficient basis.

State Court Refuses Permission to Organize Competing Company.

The Wisconsin Supreme Court, reversing a decision of the Dane County Court, on December 8 denied the communities of Wilton and Ontario, Wis., permission to establish a Union Cooperative telephone company. Farmers in these communities took out their telephones and went on a strike against the Ontario & Wilton Telephone Co. after the commission allowed the company a rate raise three years ago.

The supreme court's decision says, in effect, that these communities have taken the wrong course to set right an injustice which the subscribers believe was inflicted when the rates were raised.

The public service commission and the telephone company maintained that no complaint of poor service had been made and that the permit could not have been issued because the applicant failed to prove its financial qualifications or resources and to show probable cost of construction of a plant and the rates necessary to be charged. The commission took no stand on the question of whether it could legally issue a permit to the applicants inasmuch as the Ontario & Wilton company had a monopoly under indeterminate permit law.

The communities felt keenly against the company; that feeling of bitterness still holds, it is stated. If a permit could be obtained for a second company, the residents could still hold their bitterness, and at the same time have telephones again. What the high court says amounts to about this: They must either give up the bitterness and proceed according to law, or continue to go without telephones.

In handing down its decision the court said: "The legislature has entrusted the commission with the power to grant or refuse such permits, and the courts could not disturb such an order of the commission unless it transgressed the bounds of reason." In other words, the responsibility is directly on the commission, and the supreme court will give it a free hand to work out for the state the best possible service and regulation.

Summary of Commission Rulings and Schedule of Hearings,

INTERSTATE COMMERCE COMMISSION.

January 8: Hearing on joint application of the Ballwin Mutual Telephone Co., St. Louis county, Mo., and the Southwestern Bell Telephone Co. for certificate authorizing the Bell company to purchase the Ballwin company. The Ballwin company operates adjacent to St. Louis.

January 8: Hearing on joint application of the Creve Coeur Mutual Telephone Co., St. Louis county, Mo., and the Southwestern Bell Telephone Co. for certificate authorizing the Bell company to purchase the Creve Coeur company, which operates in the suburban area of St. Louis.

January 8: Hearing on joint application of the East Branch Telephone Co., Warren county, Penna., and the Bell Telephone Co. of Pennsylvania for a certificate authorizing the Bell company to purchase the East Branch company. This company operates about 27 telephone stations in the townships of Eldred and Sprink Creek. Its plant is connected with the Bell.

CALIFORNIA.

December 29: Amasa S. Bryant, owner of Bridgeport Telephone & Telegraph Co., denied rehearing of complaint filed by him against the Southern Sierras Power Co.

December 29: William B. DeCarteret authorized to sell telephone property in Exeter, Tulare county, to Exeter Telephone Co., Ltd., a corporation, which he has organized and in which he owns all stock.

December 30: Time extended to December 31, 1932, in which Associated Telephone Co., Ltd., may isue and sell 65,000 shares of its preferred stock, authorized under previous order of commission. The order provides that the company may use the proceeds from the sale of such stock to reimburse its treasury on account of income expended to temporarily finance 1931 construction expenditures and to pay in part such 1932 construction expenditures as are chargeable to fixed capital accounts.

ILLINOIS.

January 7: Hearing in Sprinfield before Commisioner Kuhn on joint application of the Boynton Telephone Co., the Home Telephone Co., of Bluffs, the Illinois Telephone Co., and the Illinois Home Telephone Co. for the approval of sale by the three former companies to the latter company of their entire properties and assets and of the latter company to purchase these properties; also application of the Illinois Home Telephone Co. for a certificate of convenience and necessity for authority to issue and sell its $195,000 of preferred stock and $1,470,000 of its common stock.

MINNESOTA.

December 31: Rural rates authorized reduced from $2.25 to $1.75 gross, or $2.00 to $1.50 net, per month, in Lakeville, Dakota county, exchanges of Central West Public Service Co., effective January 1.

December 31: Petition for general rate reduction in Rosemount, exchange of Central West Public Service Co., denied. Rural rates authorized reduced from $2.25 to $1.75 gross or $2.00 to $1.50 net, per month.

NEW YORK.

January 8: Hearing at Albany before Examiner A. T. Wilkinson in proceeding on motion of the commission to inquire into the correctness and propriety of the accounts, books, records, documents and papers of the Chester Telephone Co.

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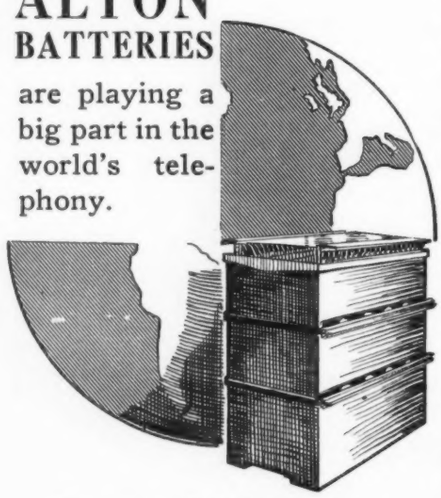

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NORTH DAKOTA.

December 12: Approval granted the joint application of Farmers Telephone Line No. 3 of Perth, and the Perth Farmers Telephone Co., to buy and sell, respectively, line No. 3 located in Howell and Monroe townships.

December 12: Approval granted the supplemental local exchange tariff which the Northwestern Bell Telephone Co. recently filed applicable to St. John.

December 12: The commission accepted for filing schedule of general rates and charges covering teletypewriter service filed by the Dakota Central Telephone Co., Aberdeen, S. D., applicable in North Dakota.

December 19: Application filed by the Tri-County Telephone Co., of McGregor, asking for authority to discontinue its exchange at Hamlet.

December 22: Approval granted the application of the Northwestern Bell Telephone Co. for authority to discontinue its toll station at Russell.

December 22: Approval granted the application of the Northwestern Bell Telephone Co. for authority to discontinue its toll station at Logan.

January 18: Hearing in Valley City on application of the Kathryn Telephone Co. to discontinue service at Kathryn.

OHIO.

December 24: Ohio Telephone Service Co. and the Farmers Telephone Co., both of Sidney, authorized to put into effect a temporary plan for switching calls from one to the other during the next six months pending hearing of an application for permission to consolidate their companies. Under the proposal the Farmers company will pay $50 monthly to the Ohio Telephone Service Co., which now controls the trunk lines.

January 20: Hearing in Ohio Bell case on requests of Attorney General Bettman to furnish specific data relative to Western Electric profits particularly during the years 1925 to 1931.

WISCONSIN.

December 29: Order issued authorizing the Commonwealth Telephone Co., a subsidiary of Associated Telephone Utilities, of Madison, to issue $45,200 common stock for the purpose of securing funds with which to acquire the properties and assets of a number of telephone companies.

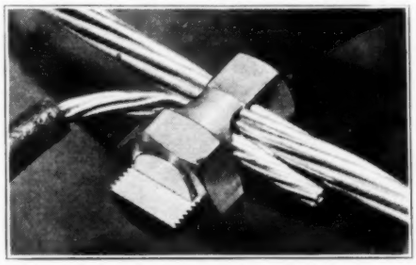
With Manufacturer and Jobber

New Single Unit Wire Connector Announced by Matthews.

A new type wire connector of a single unit has been announced by the W. N. Matthews Corp. This new connector is the "Univise"—its name being derived from the "vise-like" action with which its single unit holds the wires together.

The new connector has only one unit—clamping jaw and nut cannot be removed from the bolt; therefore, no parts to drop or lose when connecting wires. No cross threading is possible, it is stated.

In these new Univise connectors 52 per cent of the original bolt is retained after it is slotted, thus giving it great strength. The connectors are made to endure as all



The New Matthews Univise Connector.

parts are made of bronze with 90 per cent copper content.

Because of the design and strength of Univise connectors, it is stated that linemen cannot twist off the heads or cause them to collapse under heavy wrench pressure. There is claimed to be no possibility of loose connections causing radio interference and overheating with embarrassing and costly consequences.

Due to the flexibility of the Univise connectors, it is stated that fewer sizes may be stocked as many combinations of wire connections are possible with them. These new connectors are made in seven sizes from which it is said that several hundred different combinations of wire connections can be made.

Pressure on the wires is equalized and distributed throughout the entire length of the contact groove, it is stated, and no "offset" pressure to nick, bend or otherwise damage wires. The connectors may be used again and again.

The design of Matthews Univise connectors and their flexibility permit use whenever two wires must be connected. They are easily attached with one hand and tightened into a connection that is declared to be free from vibration.

For complete information on this new product, write to the W. N. Matthews Corp., St. Louis, Mo., for the new Univise Bulletin No. 200.

New 6-800 Masterbuilt Switchboard for Mt. Joy, Pa., Exchange.

The Columbia Telephone Co. with headquarters at Columbia, Pa., recently commenced another portion of its improvement program by purchasing a new 6-800 masterbuilt switchboard from the Kellogg Switchboard & Supply Co., Chicago. Some 2,150 magneto subscribers and 1,750 common battery subscribers are being served through the Columbia Telephone Co.'s system.

The new switchboard is to be installed in the Mount Joy exchange, one of the three exchanges that the company operates in Lancaster County. It is a thriving agricultural and industrial town that is growing rapidly. The exchange is also ex-

long life

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periencing a substantial growth in toll traffic. And because of these growths, the Columbia Telephone Co. purchased a masterbuilt switchboard.

As growth continues, and changes or additions are required in the positional units of the new switchboard, such changes or additions can be made quickly and easily without excessive costs or interruption of day-time service. These and other masterbuilt flexibility features are said to assure the telephone company a safe investment in equipment.

The new three-position 6-800 masterbuilt switchboard for Mount Joy, is wired and equipped for 300 universal local lines, 20 magneto rural lines, and 40 toll lines.

H. A. Oberdorf, general manager of the company, plans to have the new masterbuilt switchboard installed and cut into service early this year.

Emergency Shipment from Stock of Unusual Size Poles.

The Valentine Clark Corp., St. Paul, Minn., recently made a shipment of poles from stock that was unusual.

One of its pole-using customers in New Jersey had a serious interruption of service due to the mast of a yacht tearing down six high-voltage wires. The power company was immediately notified by the federal authorities that proper clearance had to be maintained. This required a total of 38 poles ranging from 60 feet to 115 feet in length.

The lines are so located that any type of steel tower would have been prohibitive in cost as well as result in a serious delay in the repairs, so this company was seeking a source of supply which was equipped to supply these unusual lengths of poles and do it quickly.

The poles were shipped from reserve stocks of the Valentine Clark Corp. in the west the same day the shipping instructions were received; and they were transported clear across the country—which included being unloaded at Minnesota Transfer for creosote butt treatment—and delivered on the Atlantic coast in less than 21 days. All the poles, loaded on three cars because of their great length, reached their destination in perfect condition.

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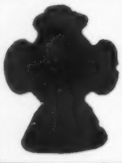
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R. J. MUNRO,
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